

Medical L.A.

# THE MEDICAL JOURNAL OF AUSTRALIA



VOL. I.—14TH YEAR.

SYDNEY: SATURDAY, APRIL 2, 1927.

No. 14.

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### THE RELATIONS OF TEMPERATURE AND PULSE RATE IN DISEASE: A CLINICAL STUDY.

By D. W. CARMALT JONES, M.D. (Oxon.),  
F.R.C.P. (London),

Professor of Systematic Medicine, University of Otago,  
New Zealand.

It is common knowledge that in cases of acute infection, when there is a rise of temperature, there is also a rise in pulse rate. In cases in which the resistance of the patient is good and which proceed to uninterrupted recovery, a very close correspondence is kept between temperature and pulse rate, but in cases which do badly, such correspondence is not long maintained. This paper is intended to draw attention to the prognostic significance of these relations of temperature and pulse rate in cases of fever and to the importance of certain independent variations of the pulse rate in other conditions.

Sir James Mackenzie once pointed out ("Symptoms and their Interpretation") that in cases of fever for every degree Fahrenheit which the tem-

perature rises, the pulse rises about ten beats per minute. The two are therefore related to one another as in Table I.

TABLE I.

	Pulse Rate per Minute.
98.4° F. corresponds approximately to..	72
99.0° F. corresponds approximately to..	80
100.0° F. corresponds approximately to..	90
101.0° F. corresponds approximately to..	100
102.0° F. corresponds approximately to..	110
103.0° F. corresponds approximately to..	120
104.0° F. corresponds approximately to..	130
105.0° F. corresponds approximately to..	140

If, therefore, the temperature and pulse rate are recorded on parallel charts, the same interval being used to indicate one degree Fahrenheit and ten beats of the pulse per minute, the resulting curves should correspond very closely and in some infections, at any rate in the cases which proceed to uninterrupted recovery, the two curves are practically identical and the same information is to be derived from either of them. Any deviation from this uniformity may be held to have some prognostic or pathological significance.



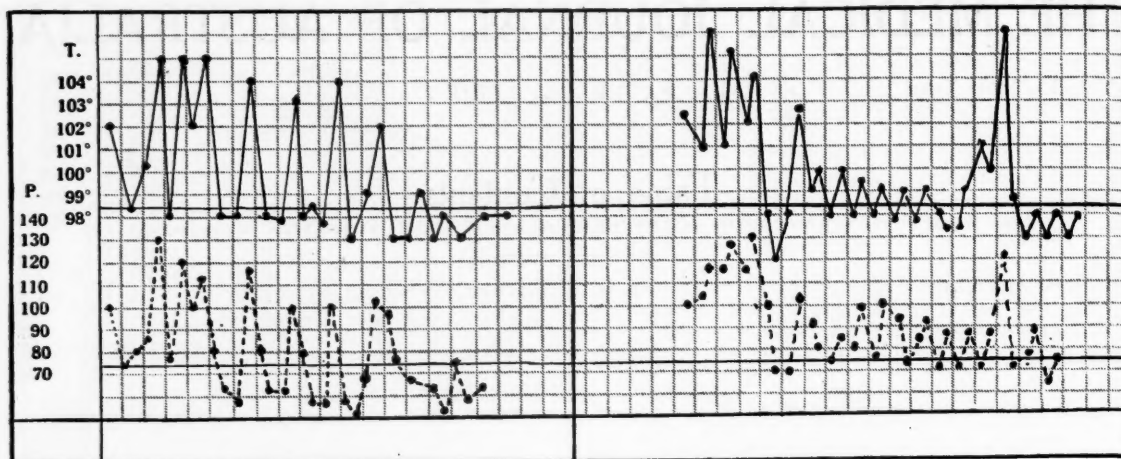


CHART I.—Malaria; Protozoon.

CHART II.—Relapsing Fever; Spirochæte.

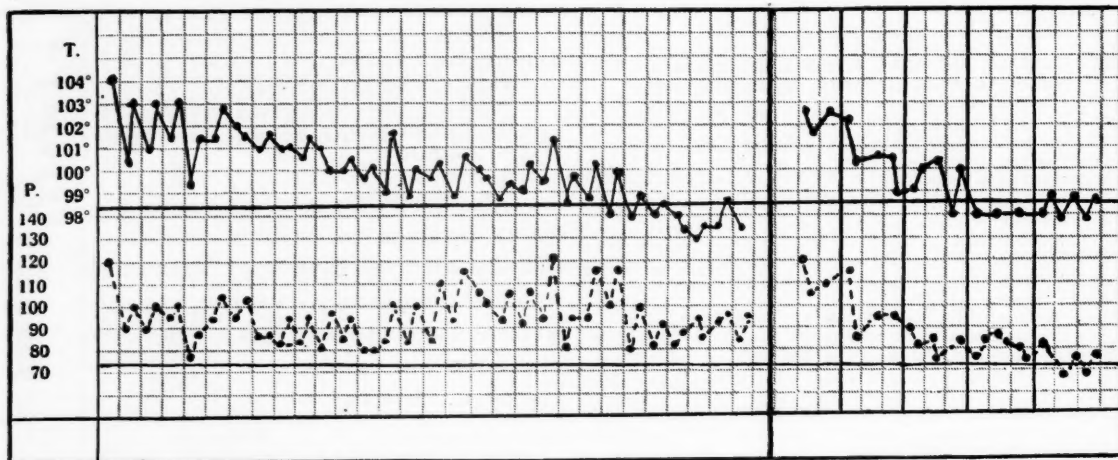


CHART III.—Typhoid Fever; Endotoxic Bacillus.

CHART IV.—Diphtheria; Exotic Bacillus.

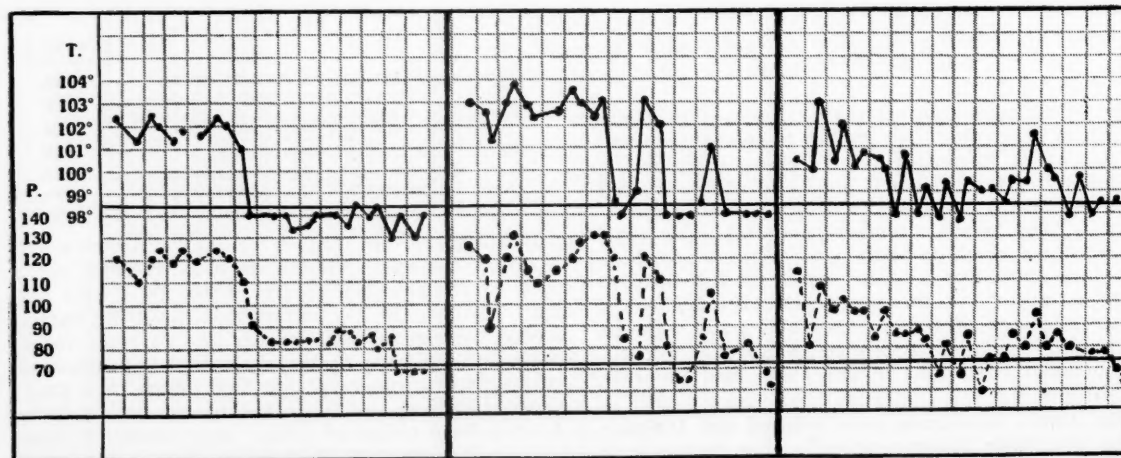


CHART Va.—Pneumonia; Endotoxic Coccus.

CHART Vb.—Pneumonia.

CHART VI.—General Sepsis; Gun-Shot Wound.



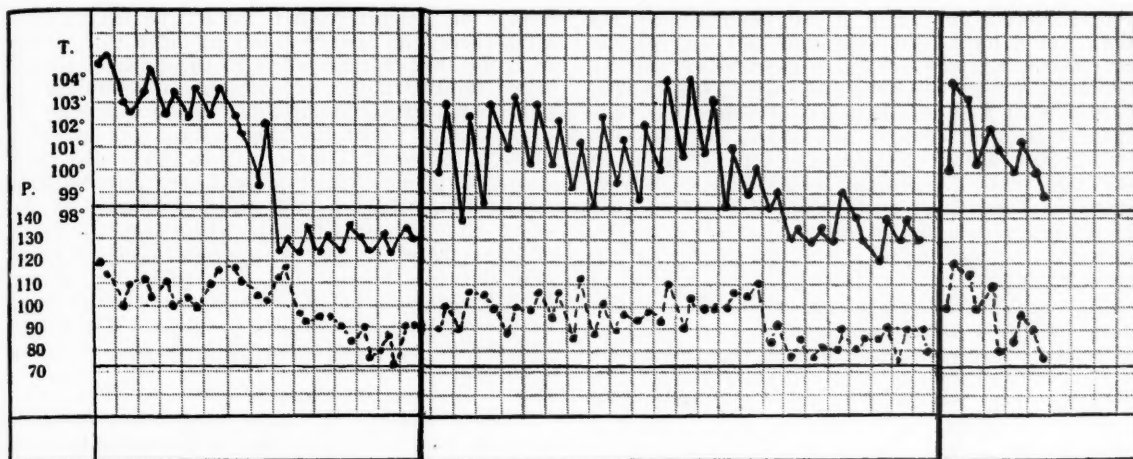


CHART VII.—Typhus Fever.

CHART VIII.—Scarlet Fever.

CHART IX.—Rubella.

In perfusion experiments with the isolated mammalian heart in the physiological laboratory, it is found that the higher the temperature of the circulating fluid, the greater is the rate of the heart's contractions.<sup>1</sup>

Unless, therefore, some inhibitory mechanism exists, whenever the temperature of the blood is raised within the intact body, there will be a rise in the pulse rate; in other words a rise of temperature causes a rise in pulse rate. The converse of this is not true; it is well known that the heart rate may be greatly increased without any corresponding rise in temperature, as for instance in paroxysmal tachycardia. A rise in temperature is only one of many stimuli which increase the pulse rate.

If the temperature of the body be raised by immersion in hot water, the pulse rate rises correspondingly. In a recent experiment on myself I obtained the following figures: (i.) At rest in bed the temperature was 97.0° F. and the pulse rate 60 per minute; (ii.) in a hot bath at 106° F. the temperature was 100.0° F. and the pulse rate 95 per minute.

There is here no indication that any mechanism is at work in the intact body which inhibits the

pulse rate from rising with the temperature. If, then, infection or "fever" in the common sense of the word means increased heat of the circulating fluids, the pulse rate in cases of fever rises as a matter of course.

#### Temperature and Pulse Rate in Cases of Fever Proceeding to Immediate Recovery.

Charts I. to X. are from cases of fever proceeding to recovery, which were due to infection by different organisms and in one case to "protein shock." The infections are due to the organisms: protozoan following recognizable (malaria), spirochete (relapsing fever), endotoxigenic bacillus (typhoid fever), exotoxigenic bacillus (diphtheria), endotoxigenic coccus (pneumonia and general sepsis). Some are of unknown origin (typhus, scarlet fever, rubella). The protein shock was due to anti-pneumococcal horse serum.

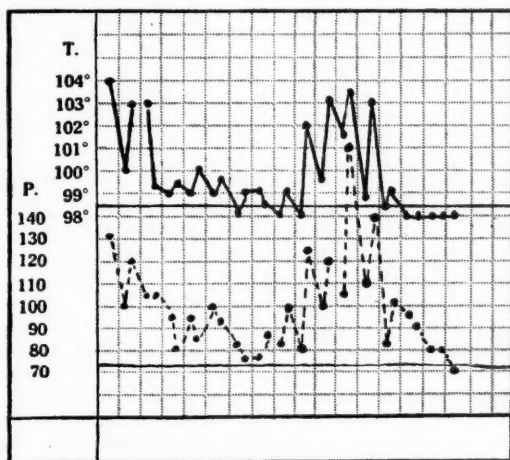


CHART X.—Pneumonia, Serum Sickness.

It will be observed that in the cases of diphtheria and pneumonia, Mackenzie's rule of a rise of ten beats of the pulse per

minute for every degree Fahrenheit rise of temperature is almost exactly observed. In the other infections when the temperature rises or falls, the pulse does the same, but not in that precise ratio, so that the two curves are similar but not exactly alike. For instance, in the case of malaria, with the high temperature of 105° F., the pulse rate did not rise above 130 per minute: ten beats less than would have been found if the ten beats for one degree were immutable. Again, the patient with relapsing fever with the very high temperature of

<sup>1</sup> Feldman and Clark (*The Lancet*, February 9, 1924) have shown that in isolated hearts the rates vary with the temperature according to the Van't Hoff-Arrhenius law. This law affirms that the effect of heat upon the velocity of a chemical reaction can be expressed by a formula; it is found that many vital processes are affected by temperature in accordance with it. The present investigation is not based on higher mathematics, but only upon the measurement of pulse rate and temperature by the common elementary clinical methods.



106° F., had a pulse rate of 130, twenty beats less than would have been estimated and between the attacks the temperature fell slightly below normal, while the pulse rate remained just above it. The excursion of the pulse rate was therefore less than that of the temperature. The same is true in a still greater degree of the case of typhus fever. At the same time the general correspondence is very close, a rise in temperature being nearly always associated with a rise in pulse rate and *vice versa*, although the rise or fall is not always of quite the same extent in the two charts.

Neglecting these minor variations, these charts may be taken to demonstrate that in cases of infection where resistance is good, there is no disturbance of the pulse rate except such as is incidental to the rise in temperature and as the temperature subsides with recovery, the pulse rate subsides *pari passu*.

If, however, the pulse rate remains high after the temperature has fallen or if it is relatively higher than the temperature, it is to be inferred that something other than the rise of temperature is affecting the pulse rate, which in a case of fever is likely to be toxic damage to the heart muscle. This is of obvious prognostic importance. There can be little doubt that in infective toxæmia the parenchyma of organs is readily damaged, the damage may be merely "functional" and capable of recovery or any degree of degeneration may occur. I have had a series of estimations of total non-protein nitrogen in blood made in cases of pneumonia, all of which showed an increase over the normal figure, more than forty milligrammes per hundred cubic centimetres of blood, which presumably indicates some temporary damage to the kidney as an excreting organ.

The functions of heart muscle which are recognized by cardiologists, are five in number: stimulus production, excitability, conductivity, contractility and tone and disturbance of these functions can be recognized by clinical methods. Disturbance of contractility is the one which is best capable of numerical record, in the sense that a heart of feeble contractile power generally compensates for the poor strength of its beat by increased frequency. In cases of infection, when the pulse rate is increased out of proportion to the temperature and other causes of tachycardia can be excluded, it may be assumed that the contractile power of the heart is damaged and that there is either temporary or permanent injury to the heart muscle.

#### Temperature and Pulse Rate in Acute Infections Rapidly Fatal.

Under that assumption a further series of charts may be considered. It is well known that in surgical emergencies a falling temperature and rising pulse are together of grave prognostic significance. The same is true of medical practice. The present study was begun when I was in charge of a ward assigned to "G.S.W. Chest," during the War, when I first adopted the practice of keeping parallel charts of temperature and pulse rate. I found then that in patients who became well

enough on general grounds for evacuation to England, there was always a fall in pulse rate, along with the temperature, while in those whose illness ended fatally, there was invariably a steady rise in pulse rate, whatever happened to the temperature. I have since found the same to be true in other acute infections. Charts XI. to XVb. are from cases of pneumonia, typhus fever, streptococcal septicæmia, influenza and gun-shot wounds of the chest, all ending fatally. It will be seen that in all of these there has been a progressive rise in pulse rate towards the end and, a point of importance in prognosis, in some of these the temperature chart by itself suggests favourable progress. The steady, progressive rise in pulse rate is the alarming symptom.

#### Intermediate Cases.

These two series of charts being taken to represent the extremes, prognosis in intermediate cases may be greatly assisted by a study of such double charts. Chart XVI. is from a patient suffering from pneumonia and afterwards from serum sickness. After the crisis he was very ill, and his pulse was very irregular in force and frequency. It will be noted it did not fall in proportion to the temperature, and was much more upset by the serum sickness than was the temperature and that it did not reach normal for about eighteen days after the crisis. The final recovery was complete. Charts XVII. and XVIII. are from cases of typhus and of scarlet fever respectively, and show similar points. It is probably wise to assume that so long as the double chart has this character the patient is not yet out of danger.

The pulse rate is clearly of great prognostic significance in acute infections, particularly if considered in conjunction with the temperature and of the two the pulse rate gives the more valuable information.

#### Intercurrent Infections in Afebrile Disease.

When a patient is suffering from a non-febrile disease and a rise appears in both curves of the double chart, an intercurrent infection may of course be assumed to have occurred. Chart XIX. is from a case of transverse myelitis in which cystitis due to *Bacillus coli* was found, and was quickly overcome by irrigation and vaccine therapy. Chart XIXa. is from a similar case of cystitis occurring in a patient under treatment for gastric symptoms. It will be seen that the disturbance of the pulse rate was far greater than that of the temperature; without this graphic record the infection might easily have been overlooked, particularly as the patient was unintelligent and did not complain of any urinary symptoms until the point indicated by the asterisk.

#### Chronic Infections.

Hitherto the only cases referred to have been acute infections, but in chronic infections also a steadily rising pulse is always to be found in cases nearing the end. Charts XX. and XXI. are from cases of tuberculous meningitis and bronchiectasis. Chart XXII. is from a long case of typhus fever in the terminal stage.



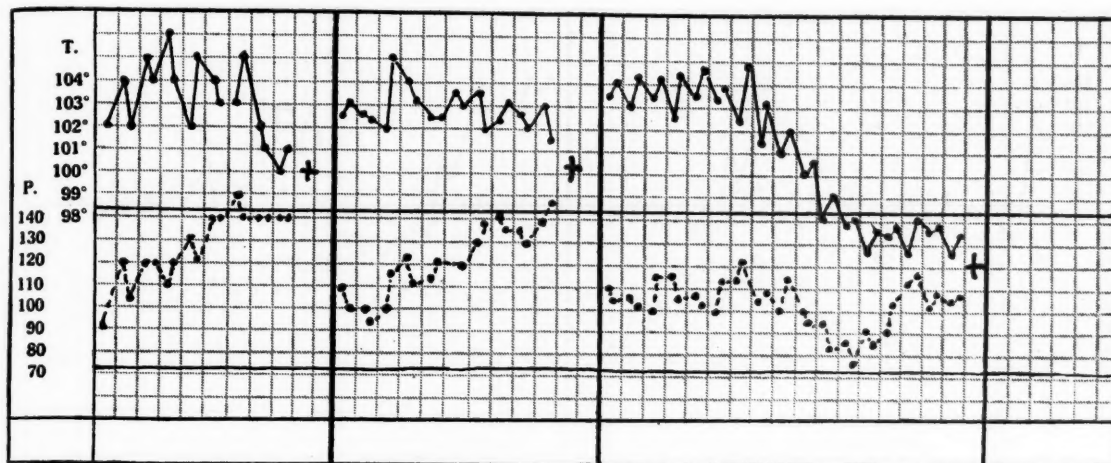


CHART XI.—Pneumonia.

CHART XIA.—Pneumonia.

CHART XII.—Typhus Fever.

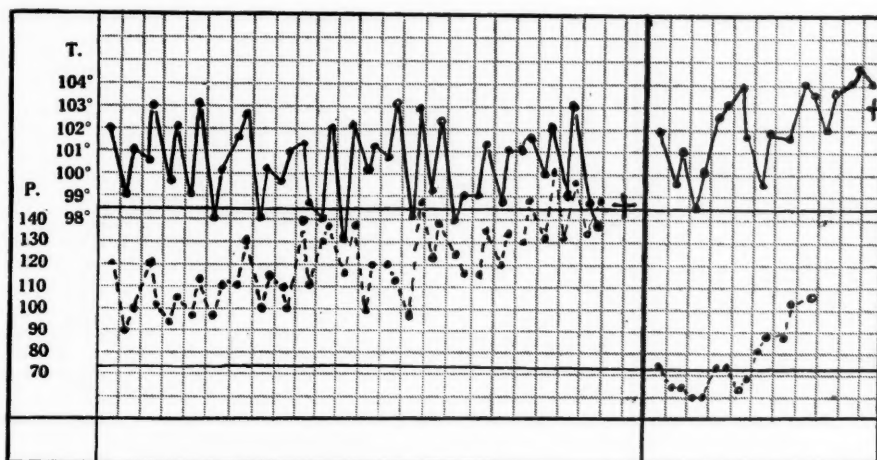


CHART XIII.—Streptococcal Septicæmia.

CHART XIV.—Influenza.

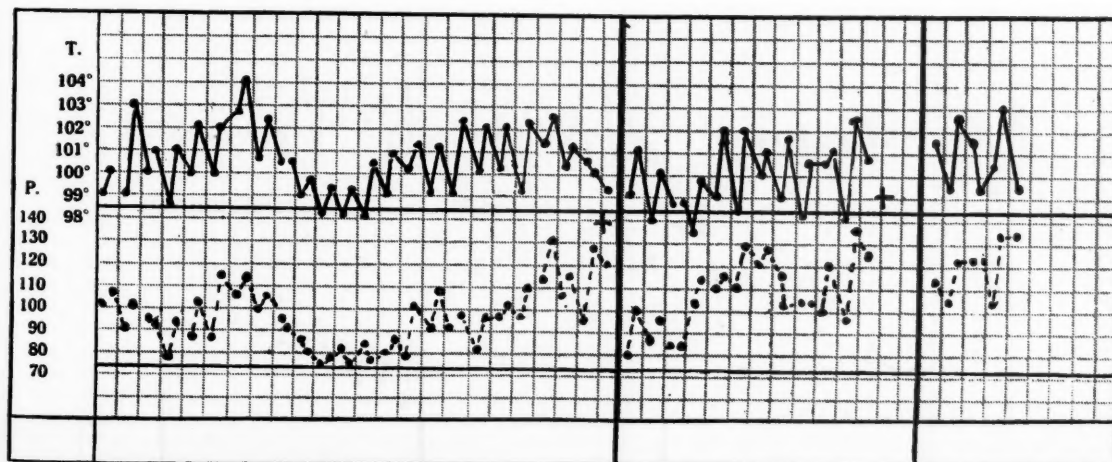


CHART XV.—Gun-Shot Wound of the Chest

CHART XVI.—Gun-Shot Wound of the Chest.

CHART XVII.—Gun-Shot Wound of the Chest.



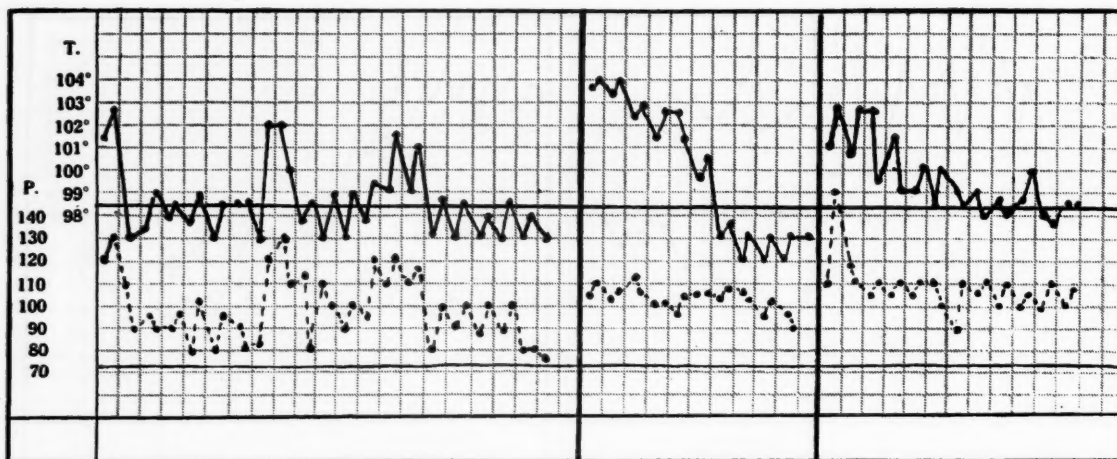


CHART XVI.—Pneumonia and Serum Sickness.

CHART XVII.—Typhoid Fever. CHART XVIII.—Scarlet Fever.

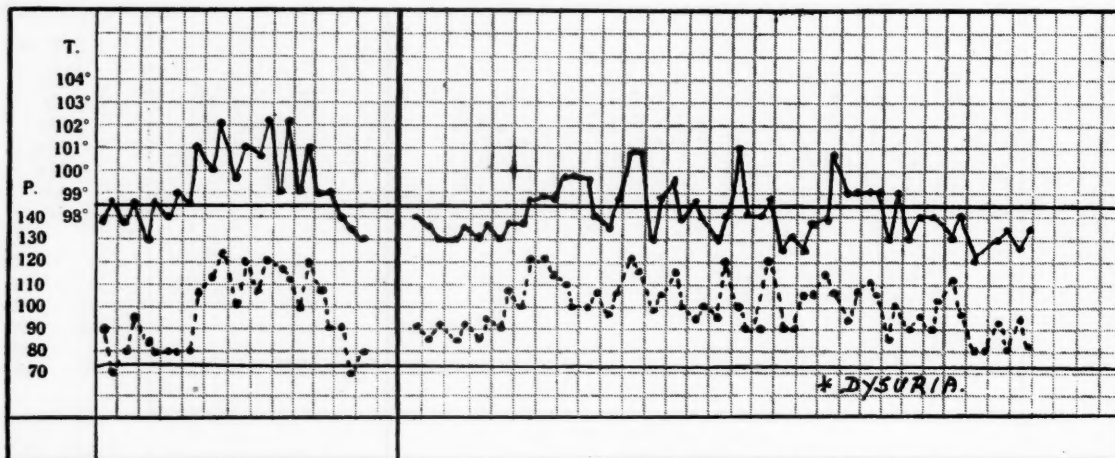


CHART XIX.—Myelitis; Intercurrent Cystitis.

CHART XIXa.—Gastritis; Intercurrent Cystitis.

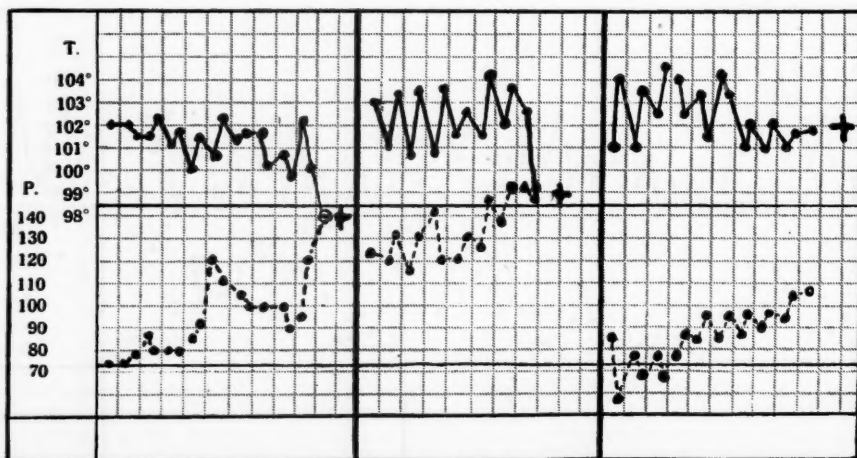


CHART XX.—Tuberculous Meningitis. CHART XXI.—Bronchiectasis. CHART XXII.—Typhus Fever; long course; fatal termination.



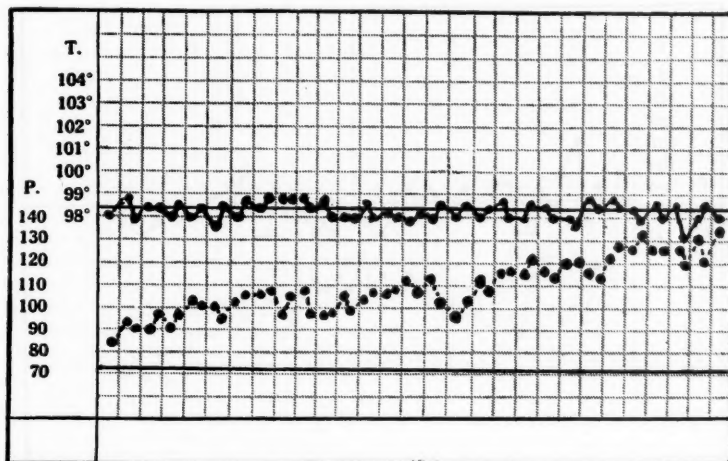


CHART XXIII.—Sarcoma of Vertebral Column. Each space represents two days.

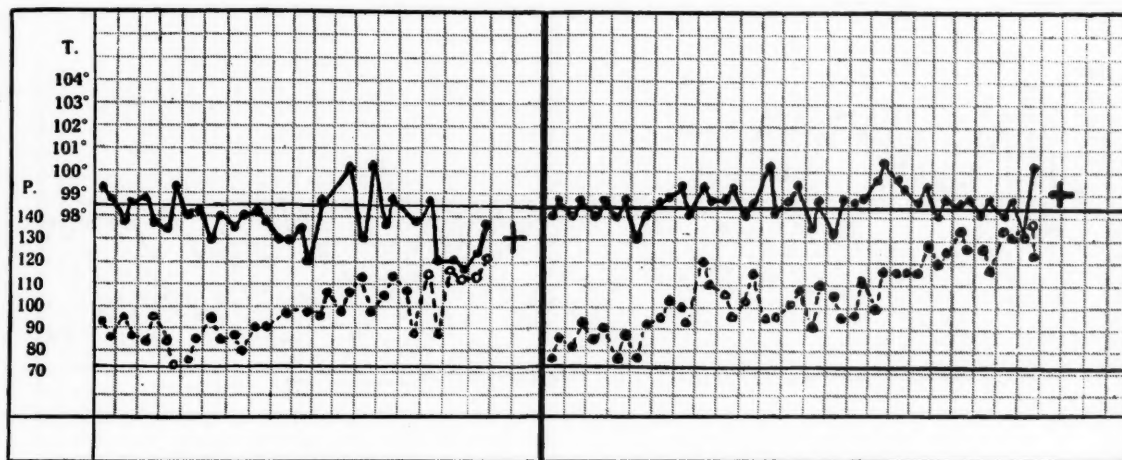


CHART XXIV.—Diabetic Gangrene.

CHART XXV.—Aplastic Anæmia.

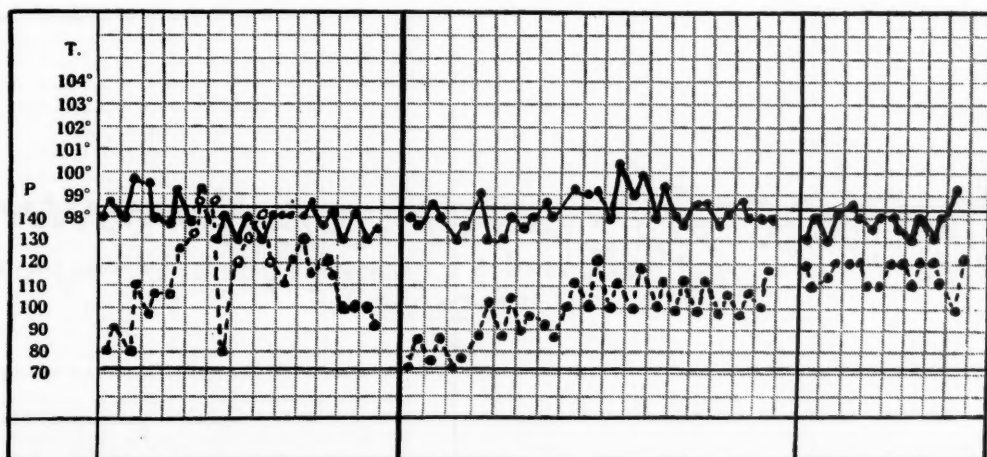


CHART XXVI.—Fractured Skull; Intercurrent Pleurisy.

CHART XXVII.—Tuberculous Pleurisy. CHART XXVIII.—Malignant Pleurisy.



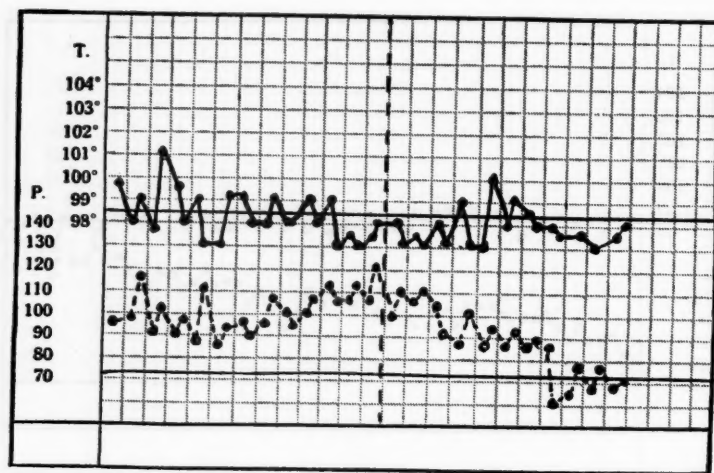


CHART XXIX.—Myocarditis; Acute Bronchitis.

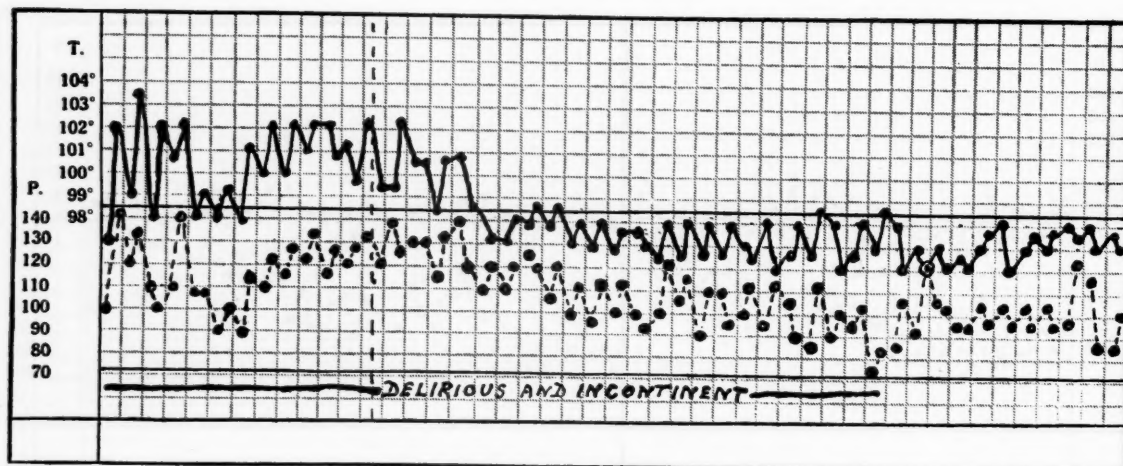


CHART XXX.—Paratyphoid Fever; Recovery.

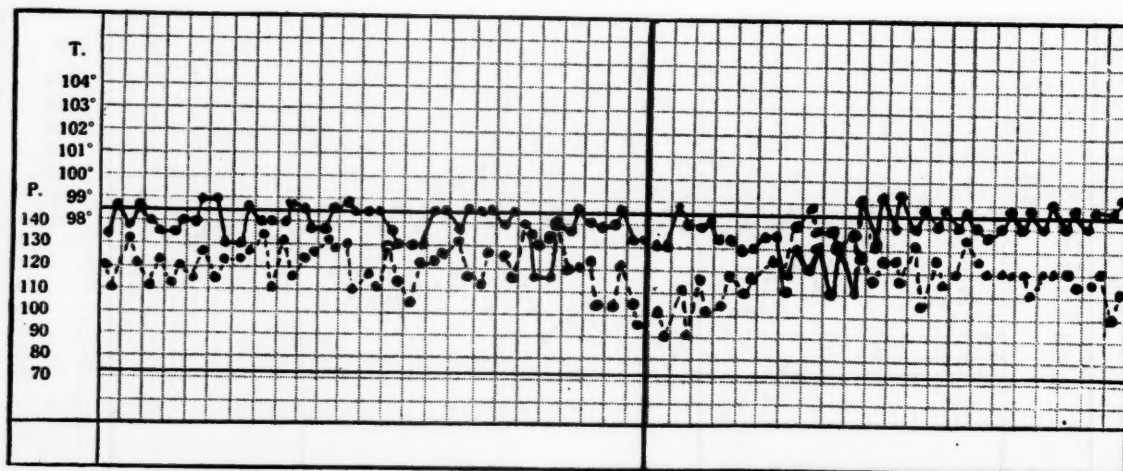


CHART XXXI.—Diphtheritic Nephritis.

CHART XXXII.—Diphtheritic Nephritis.

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**The Pulse Rate in Chronic Afebrile Disease.**

In afebrile disease of wasting character the same is true and a steadily mounting pulse rate justifies the gravest prognosis. Chart XXIII. is from a case of sarcoma of the vertebral column. Chart XXIV. is from a case of diabetes with gangrene. Chart XXV. is from a case of aplastic anæmia.

**The Pulse Rate in Disease of the Pleura.**

In all these cases I infer that the increased pulse rate is myocardial in origin and indicates poor contractility of the heart muscle. Before drawing that inference in any given case it is as well to exclude cases of pleurisy. The pulse rate in such cases is very frequently high and it seems not improbable that the disturbance is nervous in origin. It is stated that the vagus supplies both heart and pleura and the vagus may be concerned in the disturbance; that, however, is guess-work. Chart XXVI. is from a case of fractured skull with an intercurrent pleurisy. Chart XXVII. is from a case of chronic tuberculous pleurisy; the patient died of a terminal nephritis. Chart XXVIII. is from a case of malignant pleurisy.

**Recovery not Impossible.**

A study of these series of charts indicates the serious prognosis which attaches to a progressive rise in the pulse rate either in acute or chronic disorders. When the charts are arranged as here with the temperature curve above the pulse curve and at this interval with the normals seven spaces apart, it may be stated as a rule of thumb that when these curves approach one another, the prognosis is serious and when they actually cross it is very grave indeed. Such cases very often terminate fatally. The crossing of the curves does not, however, necessarily indicate a fatal result and the concluding series of charts shows how this may be the case.

Chart XXIX. is from a case of renal disease with secondary myocarditis in a middle aged woman. She was admitted to hospital with acute bronchitis and at the point of the chart marked with a vertical dotted line she was stuporose, propped in bed and falling over to the side and intensely cyanosed. Consideration of the pulse rate suggested the gravest prognosis, but recovery occurred and the patient survived for a year or two, ultimately dying of heart failure.

Chart XXX. is from a case of paratyphoid fever; at the dotted vertical line the patient was wildly delirious and again death seemed imminent, but recovery took place.

Charts XXXI. and XXXII. are from two cases of children with diphtheritic nephritis or nephritis complicating diphtheria; the similarity of the charts is remarkable. In the former case there was grave cardiac disturbance, great irregularity and dilatation and enlargement of the liver. As will be seen in each case recovery ensued.

**Conclusions.**

1. The fever of acute infections produces a rise in pulse rate which closely corresponds with the rise in temperature; conversely, when in any case

under observation rises of these characters occur, an infection is to be inferred.

2. In cases of good resistance in which recovery occurs without damage to the heart muscle, the pulse rate falls with the temperature. Any delay in the fall of the pulse rate relative to the temperature is in proportion to myocardial damage done.

3. In fatal cases there is a steady rise in pulse rate, irrespective of the temperature.

4. In chronic disease, febrile or afebrile, a steadily rising pulse rate indicates progressive failure.

5. Recovery is possible in acute cases even with grave and prolonged disturbance of the pulse-temperature ratio.

6. Study of the graphic records of temperature and pulse on parallel charts is of great assistance in prognosis both in acute and chronic disease.

---

**BIOMICROSCOPY OF THE SURFACE CAPILLARIES  
IN NORMAL AND PATHOLOGIC SUBJECTS.**

By GEORGE E. BROWN, M.D.,  
*Division of Medicine;*

AND

GRACE M. ROTH,  
*Technical Assistant, Mayo Clinic and  
The Mayo Foundation, Rochester,  
Minnesota, United States  
of America.*

THE physiologic researches of Krogh<sup>(1)</sup> and the anatomic investigation of Vintrup have corroborated Rouget's original conception of the independent action of the capillaries. While there is still some lack of agreement on this question, the bulk of the recent investigations have supported Krogh's work. Cotton, Slade and Lewis<sup>(2)</sup> have shown that the surface vessels dilate when the arterial blood flow is cut off. Dale demonstrated the selective action of histamin by the fact that the capillaries respond by dilatation and the arterioles by constriction. There is some information on the lack of uniformity in the behaviour of the capillaries in the different organs. Krogh<sup>(1)</sup> and Hirschfelder<sup>(3)</sup> and more recently Lee<sup>(4)</sup> have shown fundamental differences in the behaviour of the blood capillaries in different tissues. Lee showed that the brain capillaries do not dilate following the administration of histamin. The permeability of the capillaries to crystalloids was shown to be different in the liver and brain. Krogh<sup>(1)</sup> and more recently Richards<sup>(5)</sup> have shown clearly a numerical relationship existing between muscular and renal activity and the number of open capillaries. The question of the capillary pressures is not at all settled. In the nail-fold capillaries the pressures have been found to vary from four to twenty-five millimetres of mercury, depending on the method employed. Carrier<sup>(6)</sup> by using a direct cannular method, demonstrated low pressures varying from four to seven millimetres of mercury.

Lombard<sup>(7)</sup> in 1912, while studying capillary pressures, noted the peculiar arrangement of the vessels



in the nail-fold. The skin capillaries in these areas are arranged parallel to the surface of the skin and conform roughly to a certain morphologic standard. In these areas the skin capillaries can be easily studied by means of the microscope and much of the interest has been revealed. A group of contributions on the appearance of these vessels in disease have been made by Müller, Weiss<sup>(8)</sup> and Parrisius<sup>(9)</sup> on the continent. In America Boas,<sup>(10)</sup> Sheard and Brown,<sup>(11)</sup> Giffin,<sup>(12)</sup> Callander<sup>(13)</sup> and Crawford<sup>(14)</sup> have made contributions on the form and function of the skin capillaries in normal and pathologic subjects. The data derived from this type of investigation are too recent, insufficiently correlated or inadequately controlled with normal data to be evaluated properly at this time. The method from the clinical aspect is still *sub judice*.

#### SCOPE OF PRESENT STUDY.

This paper presents a synopsis of the work of the last four and one-half years at the Mayo Clinic on the investigation of the skin capillaries. Six hundred normal and pathologic subjects were studied. The work has been of a threefold nature: (i.) an attempt to carry out a quantitative study of the skin capillaries in a large group of normal persons of different ages, (ii.) a quantitative determination of the variations in the capillary form and flow in a large number of pathologic subjects and (iii.) an investigation of the gross<sup>1</sup> and microscopic reactions of the skin capillaries to various forms of mechanical, chemical and thermal stimuli.

#### The "Normal" Skin Capillary.

The nail-fold capillary (see Figure I.) consists of two portions, a venous and an arterial segment.

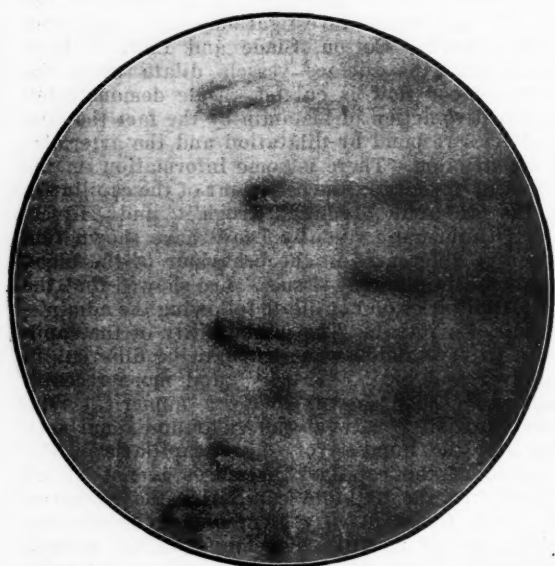


FIGURE I.

Photomicrograph of the "normal" skin capillary of the nail-fold area.

<sup>1</sup>Photomicrographic quantitative investigation of the various skin reactions is being carried out with Rowntree.

The former is usually the wider and extends onto the arterial side of the loop. The loop may have a straight or hairpin appearance or show various degrees of tortuosity. The capillary stream can be observed and its direction determined. The leucocytes can be seen as white spots; small breaks in the continuity of the stream are observed occasionally in normal subjects and more frequently in pathologic subjects. Proximal to the nail-fold area the crests of the capillaries are seen as red points of variable size in which the movement of the blood cannot be observed. The capillary, of course, cannot be seen but only its contained blood.

#### METHODS.

The following routine method of examination was employed. The patient is placed in a sitting position with the hand at the level of the heart. A small iron trough with rubber buffers allows mobilization of the finger without undue pressure. A binocular microscope with magnification of from sixty to one hundred and twenty diameters is used. The light is furnished by a special nitrogen ribbon-filament light globe. A focussing lens, water filter and orange or green screens are used to minimize the thermic and actinic effects of the light waves. Eyepiece micrometers with divisions of 0.01 and a 0.004 millimetre are used with low and higher magnifications respectively. The length of the straightest loops was measured with the eyepiece micrometer. The rates of flow were obtained by measuring the visible capillary loop and timing the passage of a leucocyte through the loop with a stop watch. Fair degrees of accuracy were obtained for velocities up to 1.5 millimetre for each second. Rates in excess of this have been indicated as too rapid for measurement.

Photomicrographs of the nail-fold vessels were made by Sheard's method for forty normal subjects between the ages of twenty and seventy years. These films were projected on a screen and a total magnification of one thousand diameters was obtained. The width of the capillary stream was measured and actual measurements calculated on the basis of magnification and enlargement. Photomicrographs were also made of the capillaries over the second and third joints and other skin areas. The total number of open capillaries for each square millimetre of skin was counted.

The area of exposure of the capillary blood was determined by projecting the films on a screen, with a total magnification of seven hundred and fifty diameters. Tracings were made of the irregular crests of the capillary loops or rather of the contained capillary blood. The area of the irregular spots was determined by planimeter methods and the average area of twelve capillary areas determined. The number of open capillaries was counted for each unit area of skin; the total area of exposure of capillary blood was obtained and the ratio of exposed capillary blood to unit skin area calculated.

#### The Magnitude of Inaccuracy of the Methods.

The quantitative methods are subject to considerable error and are relatively crude, yet they seem

Rate of capillary flow in mm each second  
5  
4  
3  
2  
1  
Age 3



to offer sufficient accuracy to justify their usage; at least directional tendencies are shown.

A fairly large error occurs in the measurement of the length of the loops because of (i.) the difficulty in determining the junction points of the capillary with the arteriole and venule, (ii.) the impossibility of measuring the more tortuous vessels and (iii.) the difficulty in measuring accurately the curved crests of the loops. Therefore the expression "visible capillary loop" has been used. An error is involved in the timing of the rates of flow which is greater when the velocity of the flow is rapid.

#### Quantitative Investigation of the "Normal Skin-Fold Capillary."

One hundred and seventy-nine normal subjects were examined in two separate groups by two observers. Their ages varied from nineteen to ninety-one. The majority of them had had complete physical examination and the necessary routine laboratory investigation. All persons who showed any evidence of disease were excluded. In no instance did the systolic blood pressure exceed 160 millimetres. The incidence of the sexes was about equal. The following conclusions were reached: (i.) The nail-fold capillaries increase in length and the incidence of tortuous loops increases with advancing age (see Figure II.); (ii.) there is no single type which can be regarded as being morphologically normal and changes in capillary form should be considered from the standpoint of age; (iii.) with accurate methods of measurement by instantaneous photomicrography of the capillaries and magnification to seven hundred and fifty diameters a progressive narrowing is observed in the capillary loop with increasing age; a difference of 30% in the

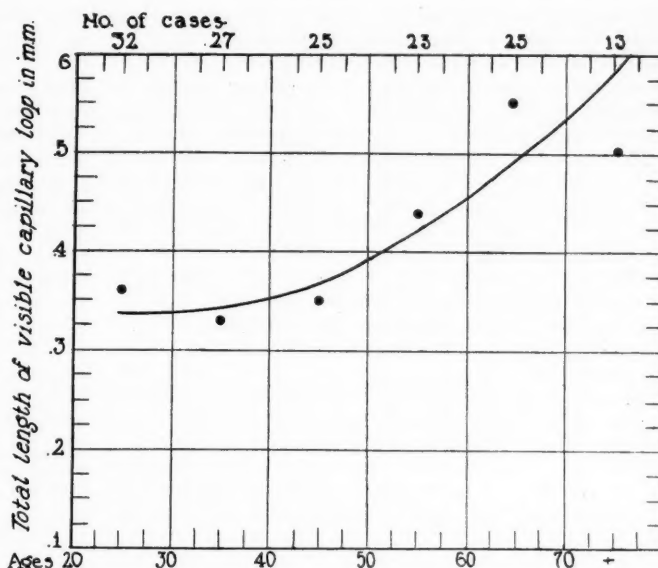


FIGURE II.

Quantitative study of the "normal" skin capillary. Curve indicating a gradual increase in the length of the visible capillary loop in the older age groups.

width of the arterial limb between the third and sixth decades was noted; (iv.) the rate of capillary flow diminishes with increasing age (see Figure III.) and (v.) the incidence of abnormal types of capillary flow increases with age. A sharp increase takes place in the fifth decade of life.

The distortion in the form of the capillary and the disturbances of function occurring with age in the normal person are interesting, but their basis can only be a subject of conjecture. Probably the capillary changes are associated with the involutionary changes in the larger vessels resulting from age. The underlying factors producing these changes would, of course, be different. The tendency toward

narrowing of the capillary lumen apparently follows the same involutionary laws. The disturbances resulting therefrom would lead to an entirely different sequence of events from those in the larger conducting portion of the vascular system. It is probably true, as Krogh has shown, that permeability and capillary dilatation are directly related. This can be demonstrated experimentally and clinically. It may be that the progressive narrowing of the capillary vessels is intimately concerned with disturbance in permeability and may be closely related to the various manifestations and disturbances of senescence.

The slowing of the capillary flow with advancing age seems to have been brought out in this study. This may be related to one of two factors or possibly both: lessening of the systolic drive of

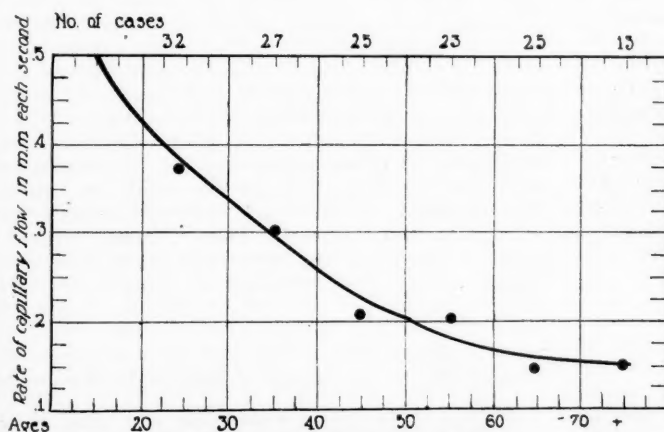


FIGURE III.

Curve showing a gradual decrease in the rate of the capillary blood flow with advancing age.



the heart or disturbance in tone in the capillaries and arterioles. In subjects with hypertension there is a distinct tendency toward faster rates of capillary flow. Several abnormal types of capillary flow were observed in the normal subject and were found with increasing frequency in the later decades of life: (i.) very slow, halting flow, (ii.) alternating fast and slow flow, (iii.) tendency toward stasis and (iv.) segmentation of the capillary stream with clear plasma spaces in the blood column. These disturbances seem to be related to disturbances of tonus in the arterioles. Diminished arteriolar and capillary tone could explain the slow and halting type of flow. With hypertonus a fast flow and with an unstable tonus an alternating type of flow could be produced. These disturbances seem more the result of both precapillary and capillary disturbances. Clear cut evidence of capillary spasm in normal subjects has not been observed in the nail-fold vessels. The presence of capillary disturbances in the absence of disease may have some significance. It is probable that the fifth and sixth decades of life are associated with vascular and vasomotor adjustments which may precede by years clinical evidence of "old age."

#### Cardio-Renal Vascular Diseases.

In many cases of glomerular nephritis, especially in the chronic stages, small contracted types of loop predominate.<sup>(15)</sup> The loops are greatly contracted and difficult to see. There is a diminished number of loops to the field and a high incidence of tortuosity. The anaemia which is so constant in this disease, increases the difficulty in seeing the loops, since it is the contained capillary blood that is seen and not the capillaries. We have not attempted study of the size and number of the capillaries in cases of glomerular nephritis because of the difficulty in securing clear cut photomicrographs. The disturbances in flow are distinctly abnormal in this disease. Spurting of the blood column with cessation of flow and disappearance of the loop is common. The stream usually has a segmented appearance because of the anaemia. The impression one gains by the study of the vessels in this disease is that there are grave and permanent disturbances of the arterioles and capillaries. This may be an expression of the widespread or constitutional tissue and vascular injury which accompanies glomerular nephritis.

The relative sparsity and contraction of the skin capillaries in glomerular nephritis undoubtedly play an important rôle in the production of the pallor observed in this disease, as higher grades of pallor are frequently observed than are compatible with the blood picture.

#### Hypertension.

In the majority of cases of essential hypertension no characteristic morphologic changes are seen in the capillaries, although apparently there is an increased incidence of the tortuous type of loop, as compared to the normal age group. One has the impression that the capillaries are narrower and more distinctly outlined than in normal subjects

of corresponding age. Quantitative data are lacking to prove this, however. The rates of flow are faster than normal. This fact is proved by the larger percentage incidence of loops with rates of flow too rapid for measurement. In cases in which the rates of flow could be measured and plotted, the curve varies considerably from the normal.

The incidence of abnormal types of flow is greatly increased in cases of hypertension. Rapid alternation of fast and slow flow and disappearance of the loops are frequently observed. There may be considerable significance in this type of disturbance of the precapillary arterioles as indicating an intermittent closure of these vessels. Such closure may be a factor in the production of increased peripheral resistance. With the information at hand, one is not justified in assuming that similar disturbances are present in other portions of the capillary bed. The loops are very fine and contracted and the impression gained is that there is definite capillary and arteriolar hypertonus with disturbances in the tonus control of the precapillary vessels.<sup>1</sup> Of one hundred patients with primary essential hypertension, ninety-two showed the hypertonic or the normal type of capillary loop and eight hypotonic types. The latter patients showed dilated capillaries and slow segmented types of flow and had cool, moist hands with a tendency to acrocyanosis.

Crawford has made some interesting studies on the pulsation in the nail-fold capillaries in patients with cardiac diseases. He has been able to demonstrate by cinematographic methods rhythmic variations in the width of these vessels.

#### Vasomotor Types of Neurosis (Raynaud's Disease).

The changes observed in the vasomotor types of neurosis and more especially in the type known as Raynaud's disease have been interesting and instructive (see Figure IV.). In studying the skin circulation of many normal subjects one group stands out in which rather characteristic disturbances of the surface circulation of the extremities are noted.<sup>(16)</sup> Between these subjects and patients with true Raynaud's disease the differences are largely of degree. Clinically these subjects exhibit cool or cold hands and feet with a tendency toward increased sweating and mild colour changes. The vasomotor nerves are abnormally sensitive to cold and frequently to excessive heat. With moderate coolness, 15° to 20° C., there is constriction of the peripheral arterioles and capillaries and later dilatation of the capillaries with slowing and stasis of the capillary stream. The capillary blood shows increased oxygen unsaturation and cyanosis. These changes are seen in mild degrees in the subnormal group just mentioned. When the disturbances are more pronounced the condition is designated by various names, as acrocyanosis and acrosphyxia. When pain or trophic disturbances exist with syncope, cyanosis and rubor, the diagnosis of Raynaud's disease is

<sup>1</sup>One case of paroxysmal hypertension was studied during the period of acute hypertension. The capillaries in the nail fold and in the more proximal areas disappeared. With lowering of the blood pressure a few capillaries opened. This may indicate a widespread closure and spasm of the smaller arterioles.





FIGURE IV.

Photomicrograph of the nail-fold capillaries in a case of Raynaud's disease. Note the atonic dilated loops and the segmented irregular filling of the loops. Several are partially invisible.

justified. The capillary disturbances in the different colour stages of Raynaud's disease have been carefully studied.

#### *Stage of Syncope or Pallor.*

The capillaries are contracted and many are invisible or partly filled, giving a ragged or broken appearance to the loops. The flow is static and if the spasm endures for several minutes, the exposed capillary blood becomes cyanotic and the skin of a pale violet hue, depending largely on the amount of blood in the surface vessels. The transition to the cyanotic stage may not be sharply defined.

#### *Cyanosis.*

In this stage the capillaries admit a little blood from the arterioles and also from the venules, indicating an intermittent relaxation of these vessels. There is not a continuous flow, but simply an irregular admission of clumps of cells into the loop. The capillaries dilate gradually, lose their characteristic shape and appear as irregular bluish areas. The capillary blood becomes deep blue or slate-coloured, indicating an increased oxygen unsaturation and more capillaries open up. This phase represents a partial recovery stage. After a variable period of time, restoration of flow takes place with the appearance of the rubor or red phase.

#### *Rubor or Red Phase.*

The capillary flow is suddenly resumed as a result of complete relaxation of the arterioles and the colour of the blood rapidly changes to bright red with a gradual decrease in the width of the capillaries. However, there is not complete restoration of capillary tone. Many additional capillaries open

up so that the rubor stage is that of an over-recovery and is abnormal in that the loops are still dilated and an excessive number of capillaries are functioning.

#### *Interpretation of the Phenomena of Raynaud's Disease.*

The following physiologic interpretation of the vascular disturbances of Raynaud's disease seems logical. The stage of syncope is due to arteriolar, capillary and probably venous constriction. The completeness of the capillary closure determines the skin colour; the degree of arteriolar constriction determines the temperature of the tissue.

Constriction of the venules is assumed since the blood starts to leave the venous side of the capillary loop independently of movement of blood in the arterial portion. Since the venules play a rôle in producing skin colour, complete pallor would also indicate closure of these vessels.

The stage of cyanosis constitutes a partial recovery or compensation phase. Some blood enters the loop from both arterioles and venules intermittently, indicating an intermittent relaxation of the precapillary and postcapillary vessels. This allows filling of the capillary but not resumption of flow. An increased oxygen unsaturation of capillary blood follows because of stasis with increased content of carbon dioxide. This probably acts as an acid metabolite causing capillary dilatation, as shown by Krogh. This phase represents a dissociation of the arterial and capillary behaviour, an independence of action.

The recovery or red phase follows a sharp relaxation of the arterial constriction. A rapid change from cyanotic capillary blood to that of red oxygenated blood follows. Recovery of the excessive capillary dilatation is not complete. This is interesting and furnishes evidence of the chemical basis for the excessive dilatation, recovery from which is not as prompt and complete as that following neurogenic vasodilatation. Many additional loops open up in the skin, producing the bright red colour of the skin. The physiologic explanation of the opening up of additional capillaries is not clear. It is probable that anoxæmia plays a rôle and that as the need for oxygen is acute, it is met not only by resumption of flow, but by the opening of all available capillary channels.

#### *Scleroderma.*

The skin capillaries show considerable disturbances in scleroderma. Eight cases have been carefully studied<sup>(16)</sup> and from the capillary changes two types of scleroderma have been differentiated: the true primary type and the secondary or vasomotor type.

In the true primary type of case the capillary changes seem quite characteristic. The most striking abnormality is the sparsity of the loops and the presence of large, distorted types. In many fields only one to three loops will be observed. The loops are so distorted that they lose all their typical morphologic characteristics. When the flow can be observed, it is usually uniform. The atrophy and



binding of the skin in these cases could be explained by the lessened number of capillaries and diminished blood supply. Whether the capillary changes are of a primary or secondary nature is not known. But avascularity of the skin, because of a numerical decrease of skin vessels, certainly plays a prominent part in the production of the pathologic sequences of this disease.

The secondary or vasomotor type of scleroderma is characterized clinically by variable changes of colour in the hands and feet related to cold. The picture is quite suggestive of that observed in Raynaud's disease. Pain may be lacking and trophic disturbances have not been observed in this group. After this condition has persisted for variable periods, a diffuse swelling of the hands or feet takes place, producing eventually scleroderma-like changes. The essential differences between these cases and those of primary scleroderma are: (i.) the evanescent character of the thickening of the skin, (ii.) the preceding vasomotor disturbances with changes of colour in the extremities and (iii.) the exciting effect of cold on the vasomotor disturbance. The capillary picture in the vasomotor or secondary type of scleroderma is quite similar to that in Raynaud's disease, although usually a few atonic or giant capillary loops are seen. We would be inclined to believe that these are cases of Raynaud's disease with metabolic disturbances of the skin probably secondary to the loss of tone in the capillary. The swelling is a form of œdema and may be due to the permeability changes in the dilated capillaries.

#### Polycythæmia Vera.

A group of twenty-two patients with *polycythæmia vera* have been carefully investigated from the standpoint of the changes in the skin capillaries. The blood volumes, number of erythrocytes and the percentage of hæmoglobin revealed the large increases typical of this disease. The spleen was enlarged in every instance. As is well known the colour of the skin is affected and is variously designated as erythrosis with or without cyanosis, brick-red or congestive skin.

The nail-fold vessels show disturbances in size which can be demonstrated quantitatively. The width of the capillaries may be twice normal (see Figure V.). The loops are longer and have the appearance of being distended to capacity. In the older patients with arteriosclerosis, the distension is not complete, as it involves only the venous limb. A sharp demarcation point between the arterial and venous segments is occasionally seen. Not all loops may show the distension and a few may retain their usual size. In other areas proximal to the nail-fold the number of open vessels for each unit area of skin were counted by photomicrographic methods and found to be two to three times more numerous than in normal skin: there was an average of seventy loops, while in normal skin thirty is the average number. The total area of the exposed capillary blood for each square millimetre of skin was determined as follows: photomicrographs were



FIGURE V.  
Capillary loops in case of *polycythæmia vera*. Note the distended appearance of the loops which is more evident in the venous segment.

made of the capillaries of the skin over the first and second joints of the fingers. The films were projected on a screen and a total magnification of seven hundred and fifty diameters was obtained. The irregular areas (see Figure VI.) representing the capillary areas or exposed capillary blood were traced on paper and the dimensions obtained by the use of a planimeter. The total area of the exposed capillary blood was computed by obtaining the average of ten such areas and multiplying by the average number of open capillaries for each square millimetre of skin area. The ratio of the area of the capillary blood exposure to a unit area of skin (one square millimetre) was calculated. In the normal person this ratio averaged 5%. In five cases of polycythæmia the ratios averaged 15%. This would indicate that the size and number of the skin capillaries are the most important factors in determining skin colour in polycythæmia, since the percentage and absolute hæmoglobin values showed increases varying from 50% to 70%.

When the capillaries are studied during the period of treatment with phenylhydrazine hydrochloride the number and size of the vessels in the skin decrease *pari passu* with the blood volume. This would indicate that the capillaries under stress can take on a storage function, but this entails certain physiologic disturbances. Thus, the common symptom of intolerance to heat so common in this disease is probably related to the failure of the proper shifts in the number of the capillaries in response to changes in environmental temperature. All or a large portion of all available skin capillaries are continually opened up for storage purposes.

The microscopic examination of the skin capillaries has opened up a new field of physiologic investigation. Considerable information has been



gained of the form and behaviour of one part of the vascular field, hitherto largely inaccessible to accurate study. The method from the clinical standpoint is still *sub judice*. The technical difficulties inherent in this type of work are great and further refinements are necessary. There is a wide variation in the form and function in the capillaries and it has been impossible to establish a single standard type of normal nail-fold capillary. The variations in the form and flow of the capillaries in many cases of glomerular nephritis and hypertension are of sufficient magnitude to justify classifying them as abnormal. The variations noted in the large heterogeneous group of vasomotor neuroses allow a grouping of these disturbances into the vasoconstrictor and vasodilator types. Their study indicates that

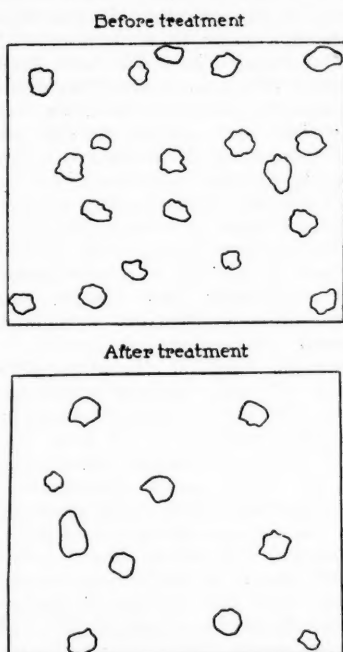


FIGURE VI.  
Sketch of the areas of the capillary tops in a case of polycythemia vera before and after treatment with phenylhydrazine hydrochloride.

the disturbance of the vasomotor mechanism is present in the peripheral arterioles, capillaries and venules. Further quantitative studies with more careful control of the effects of environmental temperature are necessary in both the normal and pathologic cases. But study of the capillaries has already proved of some practical value and has served to centre interest and attention on peripheral vascular disease.

#### SUMMARY.

Quantitative studies on the skin capillaries in the nail-fold and other areas of the skin have been made in a large series of normal and pathologic subjects. The capillaries in the normal subject

increase in length and become narrower with advancing age. The capillary flow becomes slower in the later periods of life and there is an increased incidence of abnormal types after the fifth decade of life. In many cases of chronic glomerular nephritis and in certain cases of severe primary hypertension there are definite disturbances of the flow of the capillary blood and considerable contraction of the loops. In cases of Raynaud's disease and related vasomotor disturbances there is diminished capillary tone and evident disturbance of the capillary flow in the different colour phases characteristic of the former. In cases of *polycythemia vera* the surface capillaries show distension of one or both segments and many new capillaries are opened up, thus permitting a larger exposure of capillary blood than obtains in the normal skin and forms the major basis in the production of the erythrosis.

#### REFERENCES.

- (1) August Krogh: "The Anatomy and Physiology of Capillaries," New Haven, Yale University Press, 1922, page 276.
- (2) T. F. Cotton, J. G. Slade and Thomas Lewis: "Observations upon Dermatographism with Special Reference to the Contractile Power of Capillaries, Heart, 1915-1917, Volume VI., page 227.
- (3) A. D. Hirschfelder: "Studies Upon the Vascular and Capillary Phenomena and Supposed Axon Reflexes Concerned in the Development of Edema in Mustard Oil Conjunctivitis, Together with the Effects of Vasodilator Drugs, Local Anesthetics and Vital Stains," *American Journal of Physiology*, 1924, Volume LXX., page 507.
- (4) F. C. Lee: "A Note on Differences of Capillary Activity," *American Journal of Physiology*, 1925, Volume LXXIV., page 326.
- (5) A. N. Richards: "Kidney Function," *American Journal of Medical Sciences*, 1922, Volume CLXIII., page 1.
- (6) Carrier, quoted by Krogh.
- (7) W. P. Lombard: "The Blood Pressure in the Arterioles, Capillaries and Small Veins of the Human Skin," *American Journal of Physiology*, 1911-1912, Volume XXIX., page 335.
- (8) Eugen Weiss: "Beobachtung und mikrophotographische Darstellung der Hautkapillaren am lebenden Menschen," *Deutsche Archiv für Klinische Medizin*, 1916, Band CXIX., Seite 1.
- (9) Walter Parrisius: "Kapillarstudien bei Vasoneurosen," *Deutsche Zeitschrift für Nervenheilkunde*, 1921, Band LXXII., Seite 310.
- (10) E. P. Boas: "The Role of the Capillaries in Circulatory Disorders," *The Medical Clinic of North America*, 1921-1922, Volume V., page 1007.
- (11) G. E. Brown and C. Sheard: "Measurements on the Skin Capillaries in Cases of Polycythemia Vera and the Role of These Capillaries in the Production of Erythrosis," *Journal of Clinical Investigation*, 1926, Volume II., page 423.
- (12) G. E. Brown and H. Z. Giffin: "Studies of Capillaries and Blood Volume in Polycythemia Vera," *American Journal of Medical Sciences*, 1923, Volume CLXVI., page 489.
- (13) C. L. Callander: "Photomicrographic Studies of Morphology of Surface Capillaries in Health and Disease," *Journal of the American Medical Association*, 1925, Volume LXXXIV., page 352.
- (14) J. H. Crawford and Heinz Rosenberger: "Studies on Human Capillaries, III. Observations in Cases of Auricular Fibrillation," *Journal of Clinical Investigation*, 1926, Volume II., page 365.
- (15) G. E. Brown: "Capillary Observations in Cardio-vascular-renal Disease," *Annals of Clinical Medicine*, 1922-1923, Volume I., page 69.



<sup>(10)</sup> G. E. Brown: "The Skin Capillaries in Raynaud's Disease," *Archives of Internal Medicine*, 1925, Volume XXXV., page 56.

<sup>(11)</sup> G. E. Brown and P. A. O'Leary: "Skin Capillaries in Scleroderma," *Archives of Internal Medicine*, 1925, Volume XXXVI., page 73.

### THE GRAVIMETRIC DETERMINATION OF BASAL METABOLISM.

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THE importance of determinations of basal metabolism in clinical routine has led to the appearance of apparatus for the rapid performance of this measurement. The apparatus devised for rapid determinations usually belong to the closed circuit type in which the absorption of oxygen is measured. The patient rebreathes the same air from which the carbon dioxide, that he adds to it, is removed by soda lime. The diminution of volume represents the volume of oxygen absorbed. In one type of apparatus the air is rebreathed from a bag originally containing a known volume, the time required to bring about a certain known diminution of volume being measured. In another the air is circulated round a closed system which includes a gasometer and the diminution of volume in a given time is measured. In the latter case the circulation may be brought about by the respiratory movements of the patient, directed by valves in one direction or by a circulating pump electrically driven. In each of these apparatus the air enclosed consists at the beginning of the experiment of atmospheric air to which oxygen has been added, so that the amount of oxygen absorbed by the patient during the measurement shall not diminish the percentage of this gas sufficiently to affect the respiration. The metabolism is calculated from the calorific value of the oxygen absorbed, assuming a value for the respiratory quotient and the surface area of the patient. The measurements of volume are subject to corrections for temperature, barometric pressure and humidity.

Apart from the precautions needed when large volumes of gases are being measured, the assumption is made that the removal of carbon dioxide in the apparatus is complete and that the diminution of volume observed represents the whole of the oxygen absorbed. This assumption cannot readily be verified. The impossibility of adequate control in apparatus of the closed circuit type and the fact that the patient rebreathes air from a closed system which cannot be satisfactorily cleaned after use, have prevented a general acceptance of methods of this kind and even in some cases to abandonment after adoption in spite of their rapidity and convenience.

In the open circuit method usually employed the patient breathes atmospheric air for a measured time through a valved mouthpiece by means of which his expired air is directed into a Douglas bag.<sup>(3)</sup> The total volume of expired air is measured

and analysed for carbon dioxide and oxygen. From the figures so obtained, together with the necessary data for the surface area of the patient, his metabolism may be calculated. While there is no question as to the accuracy and completeness of this information given by this method when properly carried out, its tediousness leaves much to be desired when used for routine examinations. A method which combines a suitable degree of analytical control with simplicity of technique and calculation would be of great help in this class of work.

With the object of providing a method having these advantages King<sup>(8)</sup> has devised an apparatus in which the determination of metabolism is based on the gravimetric estimation of the carbon dioxide exhaled in a measured time. There is, of course, nothing new in the gravimetric determination of expired carbon dioxide in connexion with estimations of metabolism. Those who have devised apparatus for rapid determinations of metabolism, however, have usually chosen to measure oxygen consumption rather than carbon dioxide production, because the former can be measured volumetrically and because the calorific equivalent of oxygen is less affected by variation of respiratory quotient than is the calorific equivalent of carbon dioxide. From the latter fact it has been assumed on *a priori* reasoning that there would be a closer correlation between heat production and oxygen consumption than between heat production or metabolism and carbon dioxide production.

Apart from the doubtful advantage of volumetric measurements of this character it has been shown that there is actually a closer correlation between carbon dioxide production and heat output than between the latter and oxygen consumption. This conclusion is based on a comparison between measurements of heat production made in a calorimeter with the corresponding consumptions of oxygen and production of carbon dioxide obtained from the published results of the leading investigators in this subject. For the details of the comparison King's papers should be consulted.<sup>(5) (8)</sup> These comparisons were made upon results obtained with normal subjects. In the case of persons suffering from disease no constant or significant alteration of the respiratory quotient under basal conditions has been observed except in diabetics. In the latter the respiratory quotient is lowered owing to imperfect metabolism of carbohydrate. With this exception, therefore, estimations of output of carbon dioxide are as valid for the determination of basal metabolism in diseased conditions as in health.

The apparatus required for this method is very simple. In the procedure employed by King the patient, after being brought into the basal state, breathes from the outside air through the usual valved mouthpiece into a tube connected with a series of absorbing vessels. The first of these vessels contains granular anhydrous calcium chloride which dries the expired air. The second vessel contains granular soda lime, slightly moistened, which absorbs the carbon dioxide. The third vessel contains calcium chloride which absorbs any water carried over from the soda lime vessel. After the expiration of a



measured period the last two vessels are disconnected and weighed. The total increase of weight is the weight of carbon dioxide absorbed.

In attempting to carry out the method as described certain difficulties were encountered. To obtain complete absorption of carbon dioxide it was found necessary to use reagents so finely granular that a very perceptible resistance was opposed to the passage of the expired air. The slightest hindrance to free breathing causes the subject a feeling of discomfort which makes him apprehensive and invariably leads to increase of metabolism. Such a condition of affairs makes the result of the experiment quite unreliable, as only when the subject is perfectly tranquil is he in the basal state. Further, in the method as outlined above there is no way of knowing whether the absorption of carbon dioxide is complete. For these reasons certain modifications have been applied by which the disadvantages mentioned have been overcome without any material diminution of the simplicity or convenience of the method. These modifications are as follows.

Instead of passing his expired air directly through the absorption vessels, the subject breathes into a Douglas bag. This opposes no perceptible resistance to expiration. At the end of the measured period the tap of the bag is closed, the bag is then connected with the absorption vessels, the various taps opened and the contents of the bag sucked through by means of the ordinary laboratory suction pump. In this way the rate of passage of the gas over the absorbent can be controlled and is uniform instead of fluctuating. Finely granular reagents may be used as increased resistance is of no consequence. A wash-bottle containing lime water and a water trap are inserted between the pump and the absorption vessels. Any escape of carbon dioxide past the absorbents is at once indicated by the appearance of turbidity in the lime water. The arrangement of the apparatus is shown in the accompanying diagram (Figure I.).

The use of a pump for drawing the expired air over the absorbents obviates the necessity for the clumsy 2.5 centimetres tubing which must be used when the patient breathes directly through the apparatus. Conveniently narrow (0.8 centimetre) glass and rubber tubing to which ordinary spring clips may be applied is used for all connexions.

One charge, about six hundred grammes of Merck's soda lime, has been found sufficient for ten duplicate determinations. The number of determinations which can be carried out with one charge of the calcim chloride vessels, is over one hundred.

The method of carrying out a determination is as follows. The subject must first be in the basal condition, that is, he must have fasted for a period of twelve to sixteen hours and must be reclining in a condition of physical and mental relaxation as complete as possible. It has been found that consistent results are most readily obtained with subjects who are examined before they get out of bed after their night's rest. There seems to be a growing tendency of late not to attribute to these preparatory measures the importance which they possess. This may be due in part to conclusions drawn from results obtained by the usual method of making only one determination on a given day and repeating this on a subsequent day. Satisfactory agreement between figures obtained in this way does not necessarily mean that the subject was in the basal condition on each occasion. It may simply mean that he departed from the basal state to the same extent on each occasion, a condition of affairs which might perhaps be anticipated if conditions were similar during the two determinations. Only

when the metabolism can be shown not to be altering significantly on the occasion of the determination may it be assumed to be in a steady state. And only a method which enables the measurements to be carried out rapidly can furnish this information.

A common procedure is to make a determination of "basal" metabolism on a subject who has rested for half

an hour after moving about, perhaps after travelling some distance. This procedure, although it may give satisfactory results in the case of normal subjects, frequently does not lead to the attainment of a steady, minimal rate of metabolism in the case of persons suffering from the physical and mental discomforts associated with illness.

Before the collection of expired air is started, the subject is allowed to breathe through the mouth-piece, valves and tubing of the apparatus with the tap turned so as to connect with the outside air. He should continue to breathe through the apparatus arranged in this way for a period of about ten minutes or until all evidences of discomfort and restlessness have passed off and his respiration has become regular and tranquil. During this period the nose clip is applied and any necessary adjustments are made. King<sup>(7)</sup> has shown that even with intentional overbreathing the increased output of carbon dioxide associated with it does not persist longer than about ten minutes.

After the lapse of this preliminary period the tap of the Douglas bag is turned so as to connect

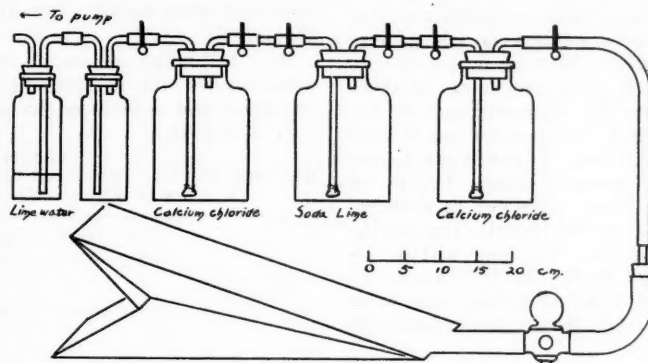


FIGURE I.



it with the mouthpiece, the time noted and the collection of expired air commenced. At the end of a measured period the tap is closed, the Douglas bag connected with the absorption vessels, its contents evacuated as described and the vessels weighed to the nearest 0.01 gramme. Two determinations are carried out in succession. If these do not differ one from the other by more than 10% the mean of the two is taken for calculation. If the agreement is not as good as this a third determination must be done. This will at once show whether the subject is becoming restless and his metabolism increasing or whether he had not settled down completely at the first determination. In the latter case the two last determinations usually agree satisfactorily and may be taken for calculation. Where successive determinations show increasing metabolism, however, it is useless to continue the experiment on that occasion.

Attempts to increase the accuracy of determinations by prolonging the period of collection, or undue repetition generally defeat their object by making the subject restless. For this reason it has been found that in most cases six minute periods of collection give as satisfactory results as ten minute periods. The rapidity with which these results can be obtained makes possible the performance of three determinations, if necessary, without unduly fatiguing the subject. When the metabolism is considerably below normal it may be necessary to use longer periods to get enough carbon dioxide for accurate measurement. These cases can be detected at once by mere inspection of the Douglas bag during the collection of the sample. The bag will be observed to be filling much more slowly than usual. The period six minutes has the advantage that when it is used one of the factors in the calculation becomes ten.

The metabolism is readily calculated from the area of the subject and the weight of carbon dioxide excreted in a measured period and from the figures given in Table I. These figures are the average weights of carbon dioxide excreted per hour per square meter of body surface by a number of normal subjects of different ages and both sexes as measured by King<sup>(6)</sup> (8). This table contains in addition to the figures published by King those for boys and girls between the ages of ten and fifteen. The figures for boys have been calculated from the results of Bedale.<sup>(1)</sup> The figures for girls have been calculated

TABLE I.  
SHOWING EXCRETION OF CARBON DIOXIDE OF NORMAL SUBJECTS  
IN GRAMMES PER SQUARE METRE PER HOUR.

Age in Years.	Grammes of Carbon Dioxide per Square Metre per Hour.	
	Males.	Females.
10-15	13.84	13.43
15-20	14.03	12.75
20-30	12.98	11.95
30-40	12.86	11.85
40-50	12.52	11.74
50-60	12.21	11.37
60-70	11.86	11.05
70-80	11.53	10.71

from the results of Bedale and those of Blunt and others.<sup>(2)</sup>

Determinations of metabolism are rarely required upon children less than ten years of age. The existing information concerning the basal metabolism of children as young as this is still very incomplete.

The accuracy with which carbon dioxide can be determined by this apparatus has been checked by collecting in it and weighing the carbon dioxide formed by the combustion of a known weight of alcohol. The alcohol used was a mixture of ten volumes of ethyl alcohol with one volume of methyl alcohol and contained 1.5% of water. Each gramme of this mixture should yield 1.33 grammes of carbon dioxide. This mixture was burned on a small burner inside a closed vessel. The vessel which was a ten litre aspirator, was connected through its upper opening with the absorbing vessels and through a lower tubulure with a gas washing tower containing soda lime. During the combustion of the alcohol and for ten minutes longer after to wash out any carbon dioxide remaining in the system, a current of carbon dioxide free air was sucked through the vessels.

The following series of consecutive determinations shows the agreement obtained between the observed and calculated weights of carbon dioxide (see Table II.).

TABLE II.  
SHOWING WEIGHTS OF CARBON DIOXIDE OBTAINED BY COMBUSTION OF KNOWN WEIGHTS OF ALCOHOL.

Weight of Alcohol.	Weight of Carbon Dioxide.		
	Theoretical.	Observed.	Percentage Difference from Theoretical.
2.882 grammes	5.29 grammes	5.29 grammes	-1.7
2.300 grammes	4.21 grammes	4.11 grammes	-2.4
1.875 grammes	3.44 grammes	3.37 grammes	-2.0
3.556 grammes	6.50 grammes	6.65 grammes	+2.3
4.610 grammes	8.45 grammes	8.46 grammes	+0.1

These figures show a variation of less than 2.5% in either direction from the theoretical figures. As no clinical significance can be attached to variations of less than 10% or even 15% from the normal basal metabolism, it will be seen that the above degree of concordance between results is amply sufficient for clinical purposes. It should be remembered also that the whole error of the analytical process falls upon the weight of carbon dioxide obtained by this method. In the volumetric method referred to three measurements are required: the volume of gas expired, the percentage of oxygen and the percentage of carbon dioxide. In addition there are the measurements necessary for the corrections for temperature, barometric pressure and pressure of aqueous vapour.

The following protocol of the measurements and calculation required in the two methods shows very well their relative convenience for clinical purposes.

Subject D.A., female, aged thirty-seven years,  
height 163 centimetres, weight 52.5 kilograms,  
area 1.55 square metres.



## 1.—INDIRECT CALORIMETRY.

Volume (uncorrected) of air expired in ten minutes (litres) .. . . .	37.94
Barometric pressure, 768.5 millimetres of mercury; temperature, 14° C.; pressure of aqueous vapour, 11.9 millimetres of mercury.	
Volume at normal temperature and pressure of air expired in ten minutes (litres) .. . . .	35.95
Percentage of carbon dioxide in expired air .. . . .	3.84
Percentage of oxygen (uncorrected) in expired air .. . . .	16.20
Percentage of oxygen absorbed (corrected) .. . . .	4.98
Volume of oxygen absorbed (litres) .. . . .	1.79
Percentage of carbon dioxide excreted (corrected) .. . . .	3.81
Respiratory quotient .. . . .	0.765
Calories per litre of oxygen absorbed at above respiratory quotient .. . . .	4.758
Calories per square metre per hour .. . . .	33.0
Normal value (Sainborn) .. . . .	34.7
Basal metabolic rate .. . . .	-5%

## 2.—CARBON DIOXIDE EXCRETION.

Weight of carbon dioxide excreted in ten minutes (grammes) .. . . .	2.91
Weight of carbon dioxide excreted per square metre per hour, normal value (King) (grammes) .. . . .	11.85
Basal metabolic rate .. . . .	-5%

In this connexion it may be pointed out that a nomogram has been prepared by Janet<sup>(4)</sup> from the formula of Du Bois and Du Bois which shows the relation between the height and weight of an individual and his surface area ( $A = W^{0.425} \times H^{0.725}$  × 71.84 where H is height in centimetres, W weight in kilograms and A is the area of body surface in

square metres). This nomogram is much more easily read than the diagram usually given for the graphic evaluation of the formula. By joining the proper points on the scales for height and weight by a straight line (for example a stretched thread or a line ruled on transparent celluloid) the corresponding area may be read off at the point where the straight line cuts a third scale between the other two. As the journal in which this nomogram appeared, is not generally accessible, the nomogram is reproduced here with the addition of scales from which the area in square metres may be read off from heights expressed in inches and weights expressed in pounds. This addition is to be excused owing to the lamentable fact that practically none of the scales or rules to be found in hospitals are graduated on the metric system.

## Acknowledgments.

In conclusion I should like to express my thanks to Professor H. G. Chapman for laboratory facilities in connexion with this work.

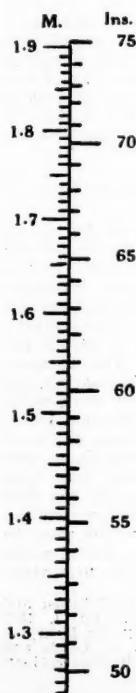
## References.

- <sup>(1)</sup> E. M. Bedale: "Energy Expenditure and Food Requirements of Children at School," *Proceedings of the Royal Society*, 1922-23, Volume XCIV.B., page 368.
- <sup>(2)</sup> K. Blunt, J. Tilt, L. McLaughlin and K. B. Gunn: "The Basal Metabolism of Girls," *The Journal of Biological Chemistry*, 1926, Volume LXVII., page 491.

## Relation between Height, Weight and Surface

$$S = 71.84 W^{0.425} \times H^{0.725} \text{ (Du Bois)}$$

$$S \text{ sq m } W \text{ kg } H \text{ cm}$$



4 Janet, *J. de Physiol & Path Gén.*, 1922  
XX, 366.

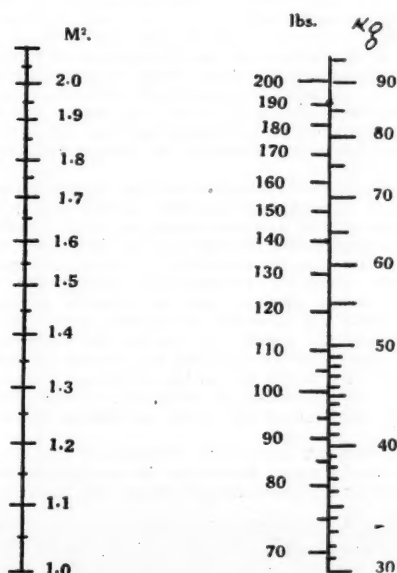


FIGURE II.



<sup>(3)</sup> C. G. Douglas: *Proceedings of the Physiological Society, Journal of Physiology*, 1911, Volume XVII., page 42.

<sup>(4)</sup> H. Janet: "*Principe, graphiques et tables de corrections pour le calcul du résultat dans une épreuve clinique de métabolisme basal*," *Journal de Physiologie et de Pathologie Générale*, 1922, Volume XX., page 366.

<sup>(5)</sup> J. T. King: "The Gas Exchange in Diseases of the Thyroid Gland," *Bulletin of the Johns Hopkins Hospital*, 1923, Volume XXXIV., page 304.

<sup>(6)</sup> J. T. King: "Basal Metabolism," 1924.

<sup>(7)</sup> J. T. King and V. B. Cross: "Superventilation and Carbon Dioxide Elimination," *Bulletin of the Johns Hopkins Hospital*, 1923, Volume XXXIV., page 349.

<sup>(8)</sup> J. T. King and Raymond Pearl: "Determination of the Basal Metabolism from the Carbon Dioxide Elimination," *Bulletin of the Johns Hopkins Hospital*, 1921, Volume XXXII., page 277.

## Reviews.

### MENTAL DISEASE.

THE fifth edition of "Mind and Its Disorders," by Dr. W. H. B. Stoddart, differs considerably from the previous editions.<sup>1</sup> There has been a thorough revision of the whole subject of psychiatry and this edition brings the work completely up to date. The author has announced himself as a loyal disciple of Freud and consequently the aetiology and treatment of many if not most of the mental disorders are quoted in terms of complexes and psychoanalysis. Although this may not please those who are not followers of Freud where insanity is concerned, yet the author's knowledge of the subject of psychiatry including normal psychology and psychology of the insane is so extensive, that it can serve as a reference book to any student of psychiatry no matter what school of thought he favours.

Although the work is described as a textbook for students and practitioners of medicine, it has reached a stage where it has outstripped the range of the unqualified student who has had no previous introduction to the subject, and it has now become a reference book for the more advanced students. These are not likely to become confused by the way in which the classifications of mental disorders are altered to suit the author's change of opinion, for example, the change of exophthalmic goitre, from being a neurosis to being a psychoneurosis and neurasthenia from being a neurosis to being a psychoneurosis.

Part I. is devoted to normal psychology and includes a wealth of information to students of all branches of medicine. Part II. deals with the psychology of the insane and herein the student can learn the explanation of the clinical symptoms of insanity. In Chapter Seven there is a discussion of the subject of psychoanalysis. Chapter Eight explains the anomalies of the sexual instincts which are so puzzling to the general practitioner when he unexpectedly discovers them among his most respectable and educated patients. In the chapter beginning Part III. which is reserved for the mental diseases, the author declares himself thus:

The neuroses, psychoneuroses and biogenetic psychoses originate from this intrapsychic conflict alone; but there are other mental diseases whose psychical manifestations bear a remarkable resemblance to these, but whose incidence is clearly traceable to physical causes, for example, alcoholic intoxication, fever, delirium and organic brain disease, such as general paralysis. In such conditions however the mental symptoms are due to intrapsychic conflict in exactly the same way; they differ merely in the fact that the failure of sublimation or repression is due not to the abnormal strength of the complex which causes it to burst its bonds, but to the organic affection of the brain weakening the repressing forces.

This statement shows the importance that the author gives to the physical factor in the production of morbid conditions and it also demonstrates the intolerance that

the followers of the psychoanalytical school show towards any suggestion that the basis of insanity may be organic. Although the author does not question the physical basis of mental disease in idiots and even devotes a chapter to physical stigmata in insanity, such as the hands in *dementia præcox*, he ignores the possibility of the mental symptoms being due to physical changes in the intricate internuncial pathways and nerve cells. The author states that the root complex of the maniacal depressive insanity is repressed sado-masochism, a kind of self-punishment. If pathological depression and exaltation are due to repressed sado-masochism, it makes one wonder what accounts for physiological depression and exaltation. In Chapter Nineteen of Part III. there is a description of *encephalitis lethargica* which is a thumb nail sketch in comparison with the usual description of the disease, but in the capable hands of the author it covers all the salient points of the disorder without wearying the reader with every occasional symptom which has been reported from all parts of the globe. The book is completed by a good working guide for the examination of the cerebro-spinal fluid.

The book could be conveniently published in three volumes. If this were done Volumes I. and II. could be bought by medical students in the early years of their studies when their work is in the general hospitals. As a complete review of insanity this book should be in the library of every psychiatrist.

### ULTRAVIOLET RAYS.

"THE QUARTZ MERCURY VAPOUR LAMP" by J. Bell Ferguson, has the advantage over many books on ultraviolet rays of being a description of one type of lamp only.<sup>1</sup> The dosage question is dealt with as fully as possible in the existing state of knowledge and a table given which, although admittedly approximate only, is something for the beginner to use as a guide, the difficulty in accurate dosage being the varying factors—lamps and patients. Dr. Ferguson is an enthusiastic advocate of the general use of ultraviolet rays in child welfare clinics *et cetera* as a prevention of rickets. Although he is very keen on such uses in public health and private practice, he does not make extravagant claims for ultraviolet rays as a cure-all and is guarded in his reports of cases. He has a useful chapter of advice as to what type of lamp the beginner should buy and there is interesting information about cost of upkeep and so forth. Sir Henry Gauvain, one of the leaders of the light therapists, has written a preface to the book.

### AN INTRODUCTION TO INFANT WELFARE.

DR. CHODAK GREGORY in her introduction to her small book on infant welfare explains that it is written for the student and practitioner who is taking up work in the infant welfare centres.<sup>2</sup> She emphasizes the difference between this work of preventive medicine and that carried out in the hospital out-patient departments. The training given to students does not prepare them to direct the mother in the care of her healthy child. The management of the centre, the general hygiene of the mother and baby, breast feeding and artificial feeding are dealt with. A short chapter is devoted to normal and abnormal stools and another to vomiting. The author concludes the book with a short review of the infantile mortality rate. She points out that the fall in infant mortality has been general and that although some of the credit for this decline must be given to the work of the infant welfare centres, there are other contributing factors which must be taken into account. This book should prove a useful guide to those who are taking up this work for the first time.

<sup>1</sup> "The Quartz Mercury Vapour Lamp: Its Possibilities and Uses in Public Health and General Practice," by J. Bell Ferguson, M.D., D.P.H., with an introduction by Sir Henry J. Gauvain, M.A., M.D., M.C.; 1926. London: H. K. Lewis and Company, Limited. Demy 8vo., pp. 120, with illustrations. Price: 6s. net.

<sup>2</sup> "Infant Welfare for the Student and Practitioner," by Hazel H. Chodak Gregory, M.D., M.R.C.P.; 1926. London: H. K. Lewis and Company, Limited. Crown 8vo., pp. 153. Price: 4s. 6d. net.

<sup>1</sup> "Mind and Its Disorders: A Text-Book for Students and Practitioners of Medicine," by W. H. B. Stoddart, M.D., F.R.C.P.; Fifth Edition; 1926. London: H. K. Lewis and Company, Limited. Demy 8vo., pp. 513, with illustrations. Price: 21s. net.



# Australasian Medical Congress (British Medical Association)

Dunedin, 1927.

## The Sections.

(Continued from page 489.)

WEDNESDAY AFTERNOON, FEBRUARY 9, 1927.

COMBINED MEETING.—SECTIONS I. AND VIII.

### The Sequelæ of Encephalitis Lethargica.

DR. H. F. MAUDSLEY (Melbourne) dealt with the neurological aspects of the sequelæ of *encephalitis lethargica*. He stated that chronic lethargic encephalitis was a disease of the extrapyramidal motor system, though not limited to it. It progressed for years with exacerbations and remissions. Parkinsonism was the commonest syndrome and varied from true Parkinsonism through bradykinesia to hyperkinesia with tics and respiratory symptoms. The striate spinal system conducted automatic movements and perhaps controlled plastic tone. Most authors referred Parkinsonism to a lesion of the *substantia nigra*.

Dr. Maudsley briefly described the structure of the basal ganglia; the *corpus striatum* was formerly of great importance, but had become overshadowed by the corticospinal tracts and the nuclei of the mid-brain; it acted only indirectly on the final common motor path through the *substantia nigra*. It probably gave rise to a non-voluntary component of voluntary movements. Injury to it caused bradykinesia, for example loss of arm-swinging in walking, also loss of voluntary movement in response to emotion.

Increased muscle tone was still debated, but increased sympathetic action in this disease was demonstrated by increased salivation and other secretory anomalies. The rigidity was reflex and could be abolished by cocaine which left tremors unaffected; the site of tremor formation was a complex question.

In this disease pyramidal tract lesions, cranial nerve palsies, especially ophthalmoplegia, pupil abnormalities, retrobulbar neuritis, epileptic seizures, bulbar symptoms, respiratory symptoms from lesions of the medulla, paræsthesiæ and mental symptoms might occur. There was no specific treatment; rest, hygiene and hyoscine by the mouth were of value. He had seen no good result from ramisection.

DR. W. MARSHALL MACDONALD (Dunedin) pointed out that lethargic encephalitis had appeared ten years previously in Europe and had been hailed as an interesting discovery. It had become an annual visitor and took a serious toll of youth and manhood. He compared encephalitis with syphilis. The original illness in both might be slight and yet the sequelæ were serious and varied. Almost every area of the central nervous system had formed the seat of attack. No matter where the lesions might occur, the quality of personality of the disease was maintained. It was at times difficult to distinguish between the disease and its sequelæ. The onset might be slow. The disease at times began as Parkinsonism. It could begin as a monosymptomatic affection. The acute disease was of varying types, the somnolent, agitated, the confusional, algæic, the myoclonic, the paralytic, the choreic, epidemic hiccup and the attenuated influenzal form. The larval, ambulatory form had also to be remembered. In Parkinsonism there was an increase of plastic tone. The rigidity had nothing to do with the tremors. The former was a true proprioceptive reflex action. In addition to the mask-like expression, slowness of movement, diminished blinking, absence of swaying of the arm in walking, slowness of speech, loss of power

of delicate movements and in writing were noted. When the patient was seated a sudden tilting backwards of his chair induced the affected limb to remain flexed against the chair. If his arm were vigorously circumducted no synergic movement followed in the other limb. Dr. Macdonald dealt with the mental and moral changes that followed an attack of lethargic encephalitis. The character of affected children became altered. In adults the mental change took the form of egocentric or uterocentric depression. The *ensemble* of the clinical picture gave the impression of a psychoneurosis. Dr. Macdonald raised the question of the nature of hysteria, neurasthenia and psychasthenia and suggested that perhaps these psychoneuroses might be produced by excitations and inhibitions due to vascular changes in the mid-brain consequent on naso-pharyngeal infections, fevers or influenza.

### Localization of Spinal Tumours.

DR. J. F. MACKEDDIE (Melbourne) read a paper on the localization of spinal tumours by cisternal injection of "Lipiodol." Compression of the spinal cord by a neoplasm could be rendered visible by the introduction of a substance opaque to X rays through the *cisterna magna*. Sicard had discovered such a substance that was of higher specific gravity than cerebro-spinal fluid and called it "Lipiodol." It was rare that "Lipiodol" would be held up in the absence of Froin's syndrome. Dr. MacKeddie described in detail the method of cisternal puncture as carried out by himself. He then related the findings in a series of patients. Case reports of these patients had appeared in THE MEDICAL JOURNAL OF AUSTRALIA. He concluded that "Lipiodol" revealed compression to be a commoner cause of spinal lesion than was formerly thought. The method was a boon to neurologists and surgeons in enabling them to localize spinal tumours. He also referred to a new preparation called "Lipiodol Ascendans" which being of lower specific gravity than cerebro-spinal fluid, could be injected into the lumbosacral region of the theca for the determination of the lower limit of an obstruction.

DR. J. RENFREW WHITE (Dunedin) described the various non-neurological methods of determining the existence and location of spinal tumours. Xanthochromia was first described by Busch in 1897. The cerebro-spinal fluid assumed a yellow colour at times. When this was associated with spontaneous coagulation of the fluid and an increased cell count, it constituted Froin's syndrome. Nonne had called attention to the increase of globulin. The localization of the tumour could be ascertained by determining the highest point at which fluid yielding Froin's characters could be withdrawn. Another method was to determine the pressure of the cerebro-spinal fluid at various levels. A similar test could be carried with the view to determine the rate of dropping of fluid from needles of the same size inserted at different levels. Dr. White then described the "Lipiodol" method, but referred to the fact that it had been reported that the fluid had become encysted on one occasion and that an operation had had to be undertaken to remove the encysted tumour. Pneumography had also been employed to delimit the level of the tumour. Ordinary X ray examination might reveal exostoses as well as spinal tuberculosis, syphilis and cancer.

DR. N. D. ROYLE (Sydney) showed cinema films of several patients suffering from the sequelæ of lethargic encephalitis who had been treated by ramisection. Patients with bradykinesia had obtained increased speed of movement, those with residual spasticity became free in their movements and the power of walking and of balancing was restored.

DR. O. DIETHELM (Sydney) testified to the miraculous improvement in the last patient demonstrated by Dr. Royle. He had been suffering from lethargic encephalitis



and the sequelæ had made it impossible for the patient to go up steps unless assisted by two people. A section of the sympathetic rami had not only enabled the patient to walk, but had restored the ability to ascend steps.

Dr. R. R. STAWELL (Melbourne) complimented the various speakers on their papers. It was splendid to get clearness substituted for confusion. The difficulty with lethargic encephalitis was how to tell whether the condition was going to progress to chronicity. Were the sequelæ not merely manifestations of the original condition? A smouldering fever surely indicated a smouldering inflammatory process, to which could be ascribed the growing rigidity. This could be detected by the pliancy of the muscles. The investigation of reciprocal movement of the muscles, which meant noting a change in muscle tone, was an important extension of neurological signs and symptoms. He referred to the use of lumbar puncture in treatment. He had seen several patients in an apparently desperate condition who had been restored to good health, though with persistent headache, by one, two or more punctures.

In his opinion Dr. Royle's demonstrations had been one of the most impressive features of Congress. He had no doubt concerning the results of ramisection. He suspected that the failure of other workers to obtain results was to be accounted for by faulty technique in a minority and by the unsuitable choice of case in the majority. The suitable type was that of encephalitis or of injury to the brain with cortical or subcortical involvement.

Dr. J. F. MacKEDDIE (Melbourne) referred enthusiastically to the new idea, born in Australia, that tone was under control of the sympathetic system. Royle and Hunter had opened a new neurological era.

Dr. S. V. SEWELL (Melbourne) subscribed to the view that the complications of lethargic encephalitis were not sequelæ, but a continuation of the inflammatory process. He had been struck by his experience of a case of a man who had had a typical attack of encephalitis. Lumbar puncture had been performed every six weeks. The cell count of the cerebro-spinal fluid at first 10 to 15 had gradually risen and at the end of two years a typical Parkinsonian syndrome had developed. Believing that this indicated persistence of the infection, he had persisted with sodium salicylate over a long period up to six months and considered that progress was more satisfactory.

He testified to the diagnostic value of "Lipiodol" in spinal tumours. By its means much information had been disclosed in obscure cases in which the patient's symptoms had been the only indication of trouble.

Dr. J. RENFREW WHITE asked Dr. MacKeddie whether he had given up all other methods than "Lipiodol" in the localization of tumours and whether he had had any experience of compression by osteo-arthritis simulating a diffused tumour. He had operated on two patients with this condition, the first with good result, the second with not such good result.

Dr. H. F. MAUDSLEY congratulated Dr. Royle on his demonstration.

Dr. MacKEDDIE in reply stated that he had used the air method with little success. Coughing and deep breathing both led to lack of propulsion of fluid out of the canal. The "Lipiodol" method was undoubtedly the best. It had the further advantage that the resident medical officer felt the onus of making a very thorough preliminary examination. Moreover by "Lipiodol" injection a hyperæsthetic area was marked off and so offered an inducement for exact neurological examination. The ascending "Lipiodol" injection was quite harmless.

Dr. J. F. MacKEDDIE (Melbourne) showed his method of teaching neurology by means of cinema films. In the first film the method of puncturing the *cisterna magna* for descending "Lipiodol" injection was illustrated. The second pictured Dr. Gordon Homes demonstrating the reactions in a neurological patient.

#### COMBINED MEETING.—SECTIONS II., IV. AND XII.

##### Inflammation and Tumours of Bone.

Dr. H. R. SEAR (Sydney) set up a radiographic classification of *osteitis fibrosa* in contradistinction to the usual

pathological classification of Bloodgood or the clinical classification of Knaggs. He held that the two conditions would appear merged into one another. He classified the condition radiographically into four main groups: (i.) Solitary cysts, with or without trabeculation, (ii.) multiple cysts, such as in Hansen's case and in his own rib and humerus case, (iii.) a somewhat cystic condition, sometimes involving one bone, sometimes many, approaching on the one hand the cyst (as in Royle's clavicle and humerus case) and on the other passing through various degrees of osteosclerosis till it merged into the type of lesion known as *osteitis deformans*. The fourth group, characterized by fine stippling or pitting, was most commonly found in jaws. It had been classified by Victor Horsley as *leontiasis ossea*; Knaggs described it as one of the osteitic types of *leontiasis ossea*; he stated that it was identical pathologically with *osteitis fibrosa*.

There was also another type of lesion, Harris's *osteitis fibrosa generalisata*, in which the fibrous changes predominated; it almost formed a link between these lesions and Albers Schönberg's disease.

It appeared that the pathological changes varied only in degree and that they were not distinct and separate in type.

Dr. Sear took exception to the statement of Knaggs to the effect that the surest way for the radiographer to differentiate was by the age of the patient. This was inaccurate and unscientific.

A short differential diagnosis on his radiographic classification was given. In several instances the two conditions existing in the same patient had been reported. Dr. Sear showed a skiagram of a mandible in which the two lesions appeared to exist side by side. He was of the opinion that in Australia what was called *osteitis deformans*, the most typical bone changes of which were usually seen in the spine and pelvis, was very common. Cysts, with or without trabeculation were not uncommon. The generalized cystic type, though not common, occurred more frequently than would have been expected from the literature.

The radiographical diagnosis was complicated in that cystic areas, fibrous tissue, myxomatous tissue and cartilaginous tissue were equally transradiant. The radiographic diagnosis, though not absolute, was of necessity the final diagnosis in the majority of cases, because few of these conditions warranted surgical interference and therefore the diagnosis of the histologist was lacking.

Dr. W. KEITH INGLIS (Sydney) submitted a paper on the relations between central giant cell tumours of bone, myeloid sarcoma, simple cysts of bone and localized *osteitis fibrosa*. The paper was read in his absence by Dr. N. D. ROYLE who demonstrated Dr. Inglis's slides. As a result of his study of bone tumours and inflammatory processes he had arrived at certain tentative conclusions. Simple bone cysts and central giant cell tumours of bone were akin. In many simple cysts soft pieces of tissue with the structure of giant cell tumours were found. Conversely in giant cell tumours portions had the structure of simple cysts. Myeloid tumours at times manifested great variety of structure. Simple cysts did not result from myxomatous degeneration in a giant cell tumour. On the other hand myxomatous softening of vessel walls appeared to predispose to cyst formation. Repair took place after the curettage of the soft tissue of a myeloid tumour. Giant cell tumours were new growths of low malignancy. It was unusual for metastases to form. Curettage was the proper treatment of such a tumour if surrounded by an intact bone shell. It was difficult to distinguish histologically between a white myeloma and localized *osteitis fibrosa*.

PROFESSOR G. GORDON BELL (Dunedin) contrasted von Recklinghausen's disease *osteitis fibrosa* and Paget's disease *osteitis deformans* and indicated the similarities between these conditions and *leontiasis ossea* and osteosclerosis. *Osteitis fibrosa* occurred in childhood and young adult life, was often localized, affected the upper and lower limbs as well as the skull and pelvis, often led to pathological fracture but rarely to tumour. *Osteitis deformans* was a disease of middle and advanced life, was rarely localized, rarely attacked the upper limbs, rarely



gave rise to fracture, but often led to tumour. In discussing the hypotheses concerning the pathogenesis of these conditions he described the inflammatory explanation of Paget, the metaplastic view of von Recklinghausen, the suggestion that disturbance of the thyroid or parathyroid glands might interfere with calcium metabolism and the traumatic hypothesis. The essence of the diseases was a decalcification of bone and a vascular fibrosis tissue substitution of the marrow and bone. He favoured local removal.

Turning to the question of tumours of bone, he drew attention to the similarity of von Recklinghausen's disease and so-called myeloid sarcoma. He had noted the appearance of giant cells in *osteitis fibrosa*, called benign by Ewing. Trauma played a part in genuine malignant tumours of bone. Local treatment was rarely successful.

DR. D. F. MYERS (Wellington) showed skiagrams of twelve patients with Paget's disease and two with *osteitis fibrosa cystica*. He pointed out that osteosclerosis was usually greater than osteoporosis in Paget's disease.

The first case was that of a man, aged forty, in whom a giant-celled tumour was present in the upper part of the left humerus. Although the arm had been amputated, the man had died later from metastases in the lung, clearly visible in the skiagram and of typical snowball appearance.

In the second case there was definite bone absorption conducive to pathological fracture. Out of the series of twelve there had been seven fractures. In this case there was evident osteosclerosis of the skull in contrast with the other bones.

The condition of *osteitis fibrosa cystica* in a child was analogous to Paget's disease in that there were deformity and osteoporosis of the long bones in each, but the skull and spine were never affected in the former. The bones were liable to fracture. Compression fractures of vertebrae did not occur as they did in Paget's disease. In one of the cases shown the malacia had developed as the parents refused to allow the child to rest. Partial fracture of the femur could be seen commencing. There was no family history of disease in either patient.

The next skiagrams were of Perthes's disease in three sisters, aged ten, twelve and fourteen. The one aged twelve had come to hospital complaining of a lump of four years' duration. Changes in both acetabula and in the head of the femur were detected in the skiagrams. The girl aged ten manifested thickening of the femoral neck with acetabular changes and fragmentation of the femoral head. The third sister had had a lump for five years and the skiagraphic appearance of Perthes's disease which had gone on to almost complete healing with good movement at both hip joints was seen.

In discussion DR. P. P. LYNCH (Dunedin) gave particulars of a case of generalized *osteitis fibrosa* in which a central giant celled tumour appeared involving the lower half of the femur. Amputation had been followed by recurrence in the stump. Death occurred from pulmonary metastases with formation of bony trabeculae in the lung nodules. Histologically the deposit in bone and that in lung were identical; there was no histological difference from the normally benign central giant cell tumour of bone.

PROFESSOR A. M. DRENNAN (Dunedin) called attention to the early forms of bone cysts seen in the case presented by Professor Gordon Bell. He referred to the bone changes in rickets in which from metabolic disturbance of the vitamin A, calcium and phosphorus balance an overgrowth of osteoid tissue occurred with deficient calcification. He regarded the changes seen in *osteitis deformans* and *osteitis fibrosa et cystica* as due to endocrine disturbance of the parathyroids. In the Dunedin case no parathyroid tissue could be found other than the large nodules of parathyroid structure, but so far oxyphile cells had not been demonstrated therein. Professor Drennan regarded the myeloid sarcoma or myeloma as a more cellular formation and a true tumour as contrasted with the hemorrhagic cysts seen in these forms of osteitis which certainly contained large multinucleated cells, but in which the stroma was denser and composed of fibroblasts and osteoblasts.

DR. A. C. B. BIGGS (Balclutha) asked whether in spontaneous fracture of a long bone due to cyst formation operation should be carried out first and the fracture treated later.

DR. MYERS replied that in one patient the fracture had remained ununited for two years, but that in others it had healed quickly.

DR. A. H. TEBBUTT (Sydney) said that it was generally agreed that the term myeloid sarcoma should be replaced by a less misleading term; Ewing's term "benign giant cell tumour" was preferable. Dawson's explanation of *osteitis fibrosa* was very interesting, that the bone cell controlled calcium metabolism in its immediate neighbourhood, that a parathyroid hormone influenced the bone cell, but certain toxic influences might depress the bone cell activities leading to the calcium absorption; the parathyroids might be stimulated and might manifest hyperplasia or as in Dawson's case adenomatous proliferations of aberrant parathyroid tissue might occur. He had been shown an almost identical case by Professor Drennan and having seen a section, thought that there was a parathyroid adenoma, though a very few colloid containing alveoli were seen. He regretted very much the absence of Dr. Keith Inglis who had taken considerable interest in bone pathology.

DR. W. R. C. STOWE (Napier) cited two cases of Paget's disease that had come under his notice which deserved mention in that they were associated with intense physical and mental activity. Both were in women about fifty years old; one had borne many children; the other was nulliparous. The past histories were free from any conditions of a devitalizing nature. They had led extremely active lives. In the latter the output of energy had been exceptional. Until this dyscrasia manifested itself, there was no evidence of physical failure. The assumption, no new one, was that biological fatigue affecting calcium metabolism was a causal factor in Paget's disease.

### SECTION III.—OBSTETRICS AND GYNÆCOLOGY.

#### Uterine Inertia.

DR. MARY C. DE GARIS (Geelong) read a paper on her conception of the nature, causation and manifestations of uterine inertia. She held that uterine inertia could be defined as weakness or inefficiency of uterine contractions, especially exhibited in labour. She held that labour could be defined as the expulsion by a hollow organ composed of plain muscle of the ovum by the action of this muscle. It was similar to micturition, defecation and the heart action. All these muscular actions were painless when healthy and she contended that normal labour was painless. Pain was an early sign of inertia. Expulsion and dilatation went on separately. She felt assured that successful uterine action depended on some special conditions that had not been discovered. She maintained that the action of the uterus was not neurogenic. Labour proceeded normally in animals in whom the nerve supply to the uterus had been divided. Although the action was myogenic, the viscerosensory and visceromotor reflexes were dependent on normal irritability. Normal activation of the uterus appeared to be of great importance. Dr. De Garis proceeded to give an account of the symptomatology of uterine inertia. She then explained her classifications of average labours. In regard to the causes of inertia she stated that departure from good general health was the determining factor. Health depended on intake of diet, air, water, drugs and the like, on infections, on heredity, on trauma and on habits of life, work, exercise and previous history. Humoral ill-health might prove a suitable soil for morbid conditions of the mother and child and for conditions like caries, cancer and tuberculosis. Labour pain was the indicator of ill-health. The specific causes should be studied and combated.

#### Puerperal Sepsis.

DR. DORIS C. GORDON (Stratford) read a paper in support of the endogenous origin of puerperal sepsis. She held the opinion that if puerperal sepsis were limited to the epidemic type of the days of Semmelweis, the medical profession would not have a serious problem to handle.



But by accepting Semmelweis's explanation of sepsis as the final word, the profession was grasping a half-truth in mistake for the whole truth. This was a national disaster. Ordinary puerperal sepsis was a matter of microbes and lowered resistance. In endeavouring to decide the origin of the microbes, Dr. Gordon referred to the investigation of Lockhart at St. Thomas's Hospital into the vaginal flora of women prior to labour. He had found that approximately 50% of the women examined had streptococci in the vaginal mucus. In 18% of these women pyrexia occurred during their puerperium. Of the 50% who did not harbour streptococci in their vaginal canals, only 1.9% had a febrile puerperium. She found other support for her contention that the bacteria were derived from within the body. She related an incident in her early days of practice. She had attended a poor woman gratuitously in her confinement. Every care had been taken, but on the tenth day after a quick labour, the patient had had rigors and had died of sepsis on the twenty-fourth day. This occurrence ruined her reputation for the time as an obstetrician. Later she had discovered that the patient had had an attack of acute gonorrhœa within five months of her confinement. On a subsequent occasion she had undertaken the care of a pregnant woman infected with gonorrhœa. The authorities had been notified that if this patient became ill with pyrexial symptoms, the hospital would not be closed. The patient had been charged a satisfactory fee; every precaution had been taken for isolation if necessary. The confinement had taken place and the patient's temperature had not been elevated to 37° C. She wanted to know why one patient with gonorrhœa had died of sepsis and the second had not manifested the slightest disturbance. She pointed out that some of the New Zealand statistics that had been recorded all over the world, were quite unreliable. They were required to report every time a woman after confinement had two rises of temperature reaching or exceeding 37.5° C. irrespective of the cause of the pyrexia. The notification was being conscientiously carried out as a result of the energetic action of the Health Department. She referred to instances of pyrexia caused by recurrent cystitis and by offending molars. These were included in the puerperal septicæmia statistics. She maintained that the medical profession should tell the truth to the public, irrespective of the effect. Sepsis had been attributed to carelessness, ignorance or incompetence of medical practitioners for so long, that it would take years to convince the public that this was not true. She pleaded for a higher place in the medical course for obstetrics. They should protest until women were confined in healthy surroundings and until trained nurses were available. In the third place she thought that the medical profession should combine to raise obstetric fees to a reasonable level. She concluded by giving some details of her methods of conducting her obstetric practice.

Dr. H. K. CORKHILL (Wellington) sympathized with Dr. Gordon. He did not agree with her in her enthusiasm for the newer idea of autogenous infection as the solution of the sepsis problem. He was prepared to believe that there was hope of help from research in regard to endogenous infection. He maintained that the most important points for attack were improvement in the training of nurses, improvement in the training of medical students, the raising of the standard of hospitals and maternity homes and the extension of antenatal supervision. He paid a tribute to the ability of New Zealand nurses and regretted that they were unable to offer sufficient inducements to the generally trained nurse to retain her services for obstetrical nursing. In connexion with antenatal supervision Dr. Corkhill found that the principle involved was the raising of resistance with which Dr. Gordon had dealt. The teaching of hygiene, the search for labial infection, for dental sepsis, for pyelitis, for cystitis and for gonorrhœa and the treatment of these conditions had for their object the raising of resistance. The same might be said of the correction of conditions that led at times to difficult labour. He thought that the better results in the cities than in the country districts of New Zealand were explained by the fact that in the cities the home facilities were better, the skill of the obstetric practitioner was on a higher plane and the antenatal super-

vision was more systematic. In regard to the question of notification he held that matters were not as bad as Dr. Gordon would have them. The medical practitioner was not required to notify raised temperature as sepsis unless there was some reasonable suspicion. He approved of the suggestion thrown out by Dr. Gordon in regard to the management of the patient, particularly in the third stage of labour.

#### SECTION V.—PREVENTIVE MEDICINE.

##### Industrial Fatigue.

Dr. J. S. PURDY (Sydney) recalled the fact that in the early stages of the war the restrictions concerning the hours of labour had been withdrawn in the munition factories. The result of this had been that it was found that long hours of work did not pay. Dr. Purdy had examined the returns dealing with the absence from work of the employees of the City Council of Sydney from the year 1920 to the year 1925 inclusive. In these six years there had been three periods during which the employees had worked forty-eight hours a week and three periods during which they had worked forty-four hours. The accident rate in the first forty-four hour period was approximately the same as the rate during the two years preceding and the year following. On the other hand the frequency of absence on account of illness during the forty-four hour period calculated per thousand employees was 273.1, as compared with 440.3, 441.1 and 486.9 in the forty-eight hour period. Taking the employees of the Electricity Department only the figures for 1922 and 1925, years during which the working week was of forty-four hours, when compared with those of the intervening years when the employees worked forty-eight hours each week, the absence from accident and illness was very much less. The amount paid for "sickness and accident" by the Council during the period of longer hours was much higher than that paid during the period of shorter hours. In 1925 there was a remarkable reduction of the incidence of neurasthenia as a cause of absence from work. Dr. Purdy found that when little overtime was worked, the absence from illness and accident was substantially less. He held that the absence was largely the result of over-fatigue caused by long periods of overtime work.

PROFESSOR C. E. HERCUS (Dunedin) was impressed by the convincing graphs in Dr. Purdy's paper which bore out the findings of the Royal Commission. From student work alone he held that there must be proper intervals of rest for recovery in order that the best results might be obtained. He hoped that investigations begun by Dr. Purdy would be extended in view of the large population in Australia.

Dr. T. MCGIBBIN (Wellington) stated that primitive man had not worked at the pressure of the present generation. Longer rest periods were needed in modern times. He agreed that there was a definite rhythm in industry and that Saturday half-day was ineffective as a working day. The forty-four hour week would give a better rest period.

Dr. J. S. PURDY in reply pointed out that the reduction in the amount of absenteeism of Sydney City Council employees was perhaps partly due to the fact that a man would hang on until Friday instead of "reporting sick" so that he could have forty-eight hours of complete rest. The consensus of opinion was that an eight-hour day gave a better output than ten hours, but whether six hours would be better than eight hours in the end result was very debatable. Mrs. Osborne, of Melbourne, had proved to the satisfaction of the Arbitration Court that it was not beneficial either to industry or to employees to employ women in factories more than forty-four hours weekly. For all classes more recreation facilities should be provided in the large cities, more open air spaces, that longer rest periods might be beneficially used.

#### SECTION VII.—OTOLOGY, RHINOLOGY AND LARYNGOLOGY.

##### Sinusitis.

Dr. E. GUTTERIDGE (Melbourne) first gave an account of the development of the sinuses and paid particular atten-



tion to the anatomical characters and dimensions of each. He divided paranasal sinusitis into acute, subacute and chronic. The acute form was common in children whose narrow nasal passages accentuated the condition. It was often a sequela of the acute infections. The chronic form was usually associated with chronic parenchymatous tonsillitis and nasal catarrhs. Dr. Gutteridge discussed the signs and symptoms. The latter included coryza, nasal discharge, headache and gastro-intestinal disturbances, cough and at times eczematous conditions of the nasal vestibule. The signs were varied. The middle concha was often slightly pinker than normal and at an advanced stage there was often a darkening of the shade. Excessive nasal secretion on the floor of the nose, in the *hiatus semilunaris* and to the mesial side of the concha were seen. The diagnosis rested on the symptoms, signs, the result of radiography and the result of exploratory puncture. Transillumination was not a sure sign in young children. Similarly the skiagram had not the same diagnostic value in children as in adults. Exploratory puncture usually determined the diagnosis, but sinusitis was not excluded if neither mucus nor pus was removed by lavage. The order of frequency of involvement was the ethmoidal, the maxillary, the sphenoidal and the frontal sinuses. In the last place Dr. Gutteridge dealt with the treatment. This comprised dietetic measures, climatic influences, nasal hygienic measures, antral lavage, correction of deflected septum if present, uncapping of the ethmoidal and sphenoidal cells, vaccine therapy (found to be of little effect in children not subjected to operation) and the Jansen operation for ethmoidal sinusitis. As a rule if infected tonsils and adenoids were removed, the resulting sinusitis cleared up.

Dr. H. F. SHORNEY (Adelaide) cited the case of a little boy, aged seven years, with severe bronchitis. After an X ray photograph had been taken and a polypoid growth had been found in the antrum, he had performed the Caldwell-Luc operation with cure of the bronchitis. He advocated the Caldwell-Luc operation in antrum trouble, because it enabled the surgeon to inspect the condition of the mucosa. Lavage under a general anæsthetic was said to be practised in America. He wished to know what precautions were taken.

Dr. T. A. MACGIBBON (Christchurch) in discussing the anatomy of the sinuses said that there was a diversity of opinion as to the time when the floor of the auxiliary antrum began to be displaced downwards. He doubted the advisability of antral lavage in patients under the age of six years. He agreed that the Caldwell-Luc operation enabled the surgeon to see the mucosa. Polypi and septæ were often seen. There was a prior stage of ozæna observed in children. This was associated with a bluish discharge of a mucoid character; there was no odour at this stage. The condition, however, was the beginning of atrophic rhinitis. A characteristic red nose was frequently encountered in children with chronic sinusitis. He advised washing out the sinuses many times before the surgeon proceeded to operative measures.

Dr. W. N. ROBERTSON (Brisbane) said that Dr. Gutteridge had called attention in his important paper to the fact that many bronchial conditions in children were due to sinusitis or bronchiectasis. In his own practice he removed the tonsils and adenoid vegetations and if the condition had not responded to the treatment, he then washed out the antra frequently. He cited a case of a child with ethmoidal disease at the very early age of three years. The bridge of the nose was bulging. He had little faith in X ray photographs for children. They had not given him any real help.

Dr. R. PULLEINE (Adelaide) was glad to note that Dr. Gutteridge had called attention to the fact that in some children sinusitis was due to deficiency in diet and climatic conditions. He doubted whether true atrophic rhinitis could be cured by antral lavage or operation. In his opinion atrophic rhinitis was quite uninfluenced by operative treatment.

Dr. GUTTERIDGE in reply said that a radical Caldwell-Luc operation was performed if the mucosa was found to be thickened or polypoid. He employed ethyl chloride anæsthesia for antral lavage in children. The trocar was in-

serted and the child was then allowed to regain consciousness. The head was placed well forward and the antrum was syringed gently. No pain was felt. He advocated lavage four or five times. Then an intranasal opening was made. The Caldwell-Luc operation was the last resort. He held that there was very little ozæna in Melbourne.

#### Allergy of the Respiratory Tract.

Dr. GEORGES PINESS (Los Angeles) classified persons subject to hay fever and asthma as demonstrably sensitive and not demonstrably sensitive. Of the former some were sensitive to seasonal influences which were divided into two classes, pollens and food, while others were affected by perennial influences, namely pollens, foods, dusts, bacteria and miscellaneous factors. The second group derived their sensitization from bacteria, physical agents, such as heat or cold, and from psychic influences. After reviewing the literature of the allergic condition, Dr. Piness dealt with the diagnosis. The personal and family history at times provided an indication. Physical examination was essential for the purpose of differentiating between asthma, pulmonary tuberculosis, myocardial insufficiency and foreign body in the bronchus. Many allergic individuals exhibited the signs of sinusitis, otitis media and nasal obstruction. X ray examination of the chest was useful in excluding other diseases. The skin tests were the most important diagnostic aids. Dr. Piness used the scratch method and the intradermal injection. The latter was not free from risk and was therefore not employed unless the result of the former was doubtful. He emphasized the necessity for extreme care in the preparation of the protein. He had given up commercially prepared proteins. The amount of protein brought into contact with the cells of the person to be tested was also important. He dealt in some detail with the method of application. The recognition of the reaction occupied his attention in the next place. He divided the reactions into four types. In the first there was a zone of erythema, but no wheal. In children this was to be regarded as a sign of allergy. The second was present when a small wheal with pseudopodia surrounded by an area of erythema and accompanied by itching appeared. In the third there was a large wheal and an intenser reaction than in the second. The fourth type was characterized by a wheal of greater diameter than 0.5 centimetre. In discussing the treatment Dr. Piness pointed out that it was useless to treat hypersensitivity to a protein with which the patient did not come into contact, even if this hypersensitivity were well developed. The specific treatment was usually of great use. He employed it as pre-seasonal treatment, anticipating the attack of asthma by about fourteen weeks. Treatment during the season when the asthma was expected yielded less good results. Better results were obtained with pollens than with foods. At times it was difficult to eliminate the offending food from the diet, for example, egg, milk or wheat. He mentioned some of the details in regard to the treatment of dust, bacterial and dander hypersensitivity.

Dr. E. F. D'ATH (Dunedin) said that the pathologists had been making pollen protein in the Dunedin laboratory for twelve months and were carrying out the specific treatment of asthma. They had prepared a full series of pollen extracts and were beginning to prepare extracts of foods and of epidermis of various animals. He had followed Dr. Piness's methods very carefully. In regard to the treatment of hay fever they had obtained very good results from pollen extracts.

Dr. J. HARDIE NEIL (Auckland) said that in examining noses of female patients he had often found white powder in the nostrils. These women used face powder. He thought that this powder must be a potent cause of asthma in allergic subjects. He complained of the uselessness of some of the commercial protein preparations on the market for the testing of allergy. He considered that the medical profession should be asked to support the laboratories connected with the public hospitals in the larger cities. If medical practitioners treated their allergic patients skillfully, a large amount of quack work would be eliminated. He was in favour of an acceptance of Dr. Piness's offer to train a graduate for six months at his laboratories.



Dr. R. PULLEINE (Adelaide) raised the question whether asthma was of frequent occurrence in sinus disease. They knew that the removal of nasal obstruction brought about the disappearance of asthma in some patients.

Dr. PINES in reply said that he was sure that if they supported their local laboratories, they would obtain excellent material. If the University of Otago wished to send a graduate to his laboratories, he would welcome him and train him. Any practitioner would be welcomed at his laboratories. He had no secrets and would show visitors all his methods.

To Dr. Pulleine he said that he had had a series of eight hundred and thirty-four allergic patients who had had operations performed on their noses and throats. Not one had derived any permanent benefit. Nasal surgery would not cure the allergic condition. Polypi and obstructions were the result and not the cause of the allergy. The conditions should be treated independently. In children a lymphoedema in the region of the posterior pharynx and a boggy condition of the nose were not signs of sinus disease. They indicated a potential allergy. It was useless to treat the sinuses in these children. The fact that they were well in the mountains and suffered when at home, was characteristic of allergy.

#### SECTION IX.—PEDIATRICS.

##### Erythroedema.

Dr. A. JEFFREYS WOOD (Melbourne) pointed out that Swift, of Adelaide, had described a disease in infants and children in 1914 at the Australasian Medical Congress held in Auckland and had coined the name of erythroedema for it. The Transactions of Congress were not published until 1916. Two years later Doak had reported that he had observed the condition in several children in Bradford. In 1920 Patrick discovered instances of the disease in America and Weston named it acrodynia. Later the disease had been encountered in other countries. The proposal had been made to call the disease Swift's disease, because erythroedema was unsuitable. There was no oedema. Acrodynia was still less accurate. Dr. Wood supported the suggestion to call it Swift's disease. He had reported on his experience of the disease at the final session of the Australasian Medical Congress (Brisbane, 1920). Since then he had seen forty-three children who were suffering from the disease. Twenty-one were males and twenty-two females. The youngest was five months and the oldest three years and six months. The number of patients with the disease in his two series had numbered one hundred and thirty-one. Eighty-three of the children had been between the ages of nine and eighteen months at the time of their illness. The majority of the infants were being fed at the breast at the time of the onset. The mothers were living in good surroundings with ample fresh food. Two members of one family had been affected. One child had been taken to visit another child who was suffering from the disease. It became affected one month later. Colds and bronchitis were said to be common as early symptoms. Dr. Wood discussed the symptoms, signs and course. In regard to the prognosis he said that he had been compelled to modify his former opinion. If the children could be kept in the open air, especially in the country, the prognosis was good, but the mortality in metropolitan hospitals was high. In reviewing the work done on the pathology of the condition Dr. Wood expressed the opinion that the condition was an early stage of pellagra, possibly an infantile variety. He had tried treatment with ultra-violet light, as suggested by Dr. Bruton Sweet, but had not had much success with it.

Dr. G. BRUTON SWEET (Auckland) dealt with the treatment of erythroedema by means of the mercury vapour lamp and carbon filament lamp. He had published the result of this treatment in five children in 1925 and since that time he had had experience of four other children, making nine in all. At the Royal Alexandra Hospital for Children in Sydney twenty-six children had been treated for erythroedema in 1924 and 1925. Three were said to have been cured, twelve relieved, one unrelieved, seven had died and three were remaining under treatment. The prognosis

thus appeared to be unsatisfactory. Dr. Sweet claimed that although his series was small, the fact that 100% of his nine patients treated by ultra-violet light had recovered, was striking. He gave a short clinical history of four of these patients. The treatment consisted in exposing the patients to ultra-violet rays from the mercury vapour lamp and luminous infra-red rays from a carbon filament lamp. He was unable to determine whether the therapeutic effect was due to the combination of the two classes of rays or to the one or other. He advocated the combination of ultra-violet rays with heat rays, especially during the winter months.

Dr. E. H. M. STEPHEN (Sydney) mentioned the case of a patient with erythroedema whom he had treated successfully with pertussis vaccine. He had tried coryza vaccines for other children, but with no effect. Many of his patients with erythroedema had had coryza. In speaking of the pathology of the disease he stated that there were no typical changes of the nervous tissue by which the disease could be recognized. In the treatment he had found parathyroid glands of no value, but had had good results with ultra-violet rays. In one patient who had had rickets complicating erythroedema, the restless movements soon disappeared after exposure to ultra-violet rays. He saw no reason why the child could not remain at home while being treated. He had frequently seen sudden death while the children were asleep.

Dr. H. GRAHAM ROBERTSON (Wellington) said that treatment by ultra-violet light was successful for four reasons. It produced systemic uplift; it increased the calcium, phosphorus and iron content of the blood; it increased the haemo-bactericidal power and it increased endocrine activity.

Dr. A. PATTERSON (Wellington) spoke of the illness of a child in whom there was curious persistence of pustulation. After six injections of 1.5 cubic centimetres of colloidal manganese the pustulation had cleared up.

Dr. A. JEFFERIS TURNER (Brisbane) said that the disease was a symptom complex. There were five symptoms. The first three symptoms were present in nearly every patient. The symptoms were anorexia and wasting, debility and sleeplessness, sweating and skin rash with redness of the hands and feet, photophobia and stomatitis. He mentioned two patients in one of whom there had been persistent photophobia, but no pathological change had been observed in the eyes. It was not until later that the typical symptoms of erythroedema developed. In another patient the condition had not been diagnosed at the time; it was thought that it was a disturbance of nutrition. The patient had slept badly, but had none of the typical symptoms. There was no skin rash. In some patients there was no skin rash. Stomatitis had appeared and the patient had lost some teeth and a piece of the jawbone had necrosed. Turning to the question of prognosis, Dr. Turner stated that he always gave a favourable one. He thought that the reason that he had had no deaths was because he did not send his patients to hospital. In his treatment he regarded two things as essential, the keeping up of the child's weight and the giving of chloral and bromides or opium if necessary to soothe the child. He was not hopeful that a specific cure had been found. He was not convinced by the records of cures published. He thought that the patients got well of their own accord. At first he had regarded it as a nutritional disease, but he had changed his mind. It was not due to septic foci. He was inclined to believe that it was due to a virus of some sort affecting the sensory nervous system. He had not seen two members in one family affected.

Dr. Jeffreys Wood said that he always gave a good prognosis, that the child would be ill about three months. He warned them against hospitals because of the risk of infection. He always pointed out that there was a remote chance of sudden death.

Dr. Sweet agreed that it was better for the patients not to be admitted to hospital. In reply to Dr. Robertson he stated that he did not give calcium in treatment. His patients got rapidly better by treatment with ultra-violet light. In his opinion that treatment was quicker than any other known to him. He also mentioned a case of a patient in whom photophobia had been the first symptom



and an eye specialist had been consulted. Nothing had been found amiss with the eyes; the typical symptoms had appeared later.

#### Ultra-Violet Rays in the Treatment of Disease.

DR. H. GRAHAM ROBERTSON (Wellington) read a paper on the uses of ultra-violet rays in the treatment of disease. The wave lengths of ultra-violet rays in the spectrum lay between 3,800 and 2,100 Angström units. He stated that rays between 3,800 and 2,960 units were biotic, but possessed no germicidal action. They had great power of penetration. They could be provided by any mercury vapour or carbon arc lamp. The abiotic region lay between 2,800 and 2,100 units and these rays had the maximum of bactericidal efficiency. Water-cooled mercury vapour lamps could be used with lens pressure. Carbon arc lamps yielded approximately 5% of ultra-violet rays and 85% of infra-red rays. These rays were suitable for institutional work, particularly for children. They were biotic and stimulating. Ultra-violet rays were of value before X ray exposures and as a remedy for X ray burns. Together with infra-red rays they acted by restoring muscle power in tuberculous disease of bones and joints and in infantile paralysis. Together with diathermy the treatment was useful in chronic inflammatory processes. Dr. Robertson summarized the action of ultra-violet rays as follows. They increased the level of metabolism, they increased the bactericidal action of the blood. They increased the activity of the glands of internal secretion and especially the parathyroid glands. They also increased vitamin activity, as was seen in the treatment of rickets. They increased the calcium, phosphorus and iron content of the blood. Dr. Robertson also stated that the negative phase following the use of vaccines could be intensified by ultra-violet rays, if care were taken. He held that with few exceptions ultra-violet ray treatment replaced nothing, but was an adjunct of varying value to tried remedies. He gave a short account of the results obtained in various diseases.

DR. A. JEFFREYS WOOD (Melbourne) stated that ultra-violet rays were used extensively in all clinics in England. He had been extremely satisfied with the results. Rickets for instance were rapidly cured. He had had good results in premature infants with lowered metabolism. The treatment had the effect of stirring up the metabolism.

DR. WILLIAMS (Dunedin) mentioned a case of celiac disease which he had known to have been successfully treated by ultra-violet rays.

#### SECTION X.—NAVAL AND MILITARY MEDICINE AND SURGERY.

##### Protection of the Civil Population Against Gas Attacks.

SQUADRON-LEADER A. P. LAWRENCE, Director of Air Medical Services, Royal Australian Air Force, read a paper at the request of Sir George Syme dealing with the precautions required for the protection of the civil community against gas attacks from the air during war time. He pointed out that the wholesale use of gas bombs or sprayed liquid from aeroplanes on to cities might endanger the civil population to a very serious extent unless a plan of preparation were devised during peace time. It would be essential to inform the public concerning the effects of gas and the measures needed to evade these effects. If mustard gas were employed, especially if the liquid were sprayed, every person would have to seek shelter in their own homes or in public shelters. All windows, doors and chimneys should be closed and sealed as effectively as possible. As the gas was heavy, cellars should be avoided. In view of the danger of explosive bombs wrecking the upper floors, the safest place would be the first floors of large buildings. Shelter should be sought when the alarm was given and no one should be allowed to emerge until the "all clear" signal had been sounded. The alarm should be given by the proper authority. There should be an organization for clearing an area after an attack. The management of the protective service should be vested in the military authority, but the police, the fire brigades, the local government authorities and the ambulance services should be utilized. Men wearing masks and impervious

clothing should hose streets and other objects exposed to the sprayed liquid and if necessary should apply solution of hypochlorite to neutralize the poison. Special means should be taken to clear away collected gas. He pointed out that it should be widely known that the effects of gas poisoning were not immediate. Persons exposed to gas should be conveyed to suitable places for treatment. Under all circumstances if a person had come within the range of sprayed liquid, his clothes should be changed as soon as possible and a bath should be taken. The voluntary aid societies could also render valuable service. He gave a clear account of the proposed organization.

### Special Meeting.

#### THE RELATIONSHIP BETWEEN STATE, HOSPITALS AND PRACTITIONERS.

On Friday, February 4, 1927, at 9 p.m. a special meeting of Congress was held at the Allen Hall, University of Otago, at which the subject of the relationship between the State, the hospitals and the medical profession was discussed. DR. HARVEY SUTTON (Sydney) was in the chair.

DR. J. NEWMAN MORRIS (Melbourne) pointed out that while the modern public health system had been started by private medical practitioners, the work had gradually passed into the hands of the specialist. The general medical practitioner still regarded it as his function in life to diagnose diseases and to treat them. It had been urged on numerous occasions that the general practitioner was the most favourably situated individual to further the objects of the prevention of disease. The Royal Commissioners on Health, the British Medical Association and the Federal Committee had put forward the view that prevention was the highest aim of the medical profession. Unfortunately the medical student was not taught preventive medicine in such a manner that it dominated his life. Dr. Morris stated that there should be a steady inculcation of the ideal of prevention from the day he started his medical studies. It had been said that the most perfect system of preventive medicine would not reduce preventable diseases more than 20%. The other 80% depended on individual knowledge and action. The citizen learned more from his family doctor than from literature or lectures. Dr. Morris found that although publicity work was not welcomed by the general practitioner, it was quite permissible and indeed desirable for him to serve on baby welfare centres, on municipal bodies and in Parliament and to deliver lectures on the preventive aspects of medicine under suitable auspices.

In the next place Dr. Morris dealt with the duty of the medical practitioner to give advice to those about to marry and to carry out periodical examinations of persons to ascertain whether their apparent health was real or not. Both these services were preventive. The government could not undertake them; they had to be performed by the family doctor. A knowledge of the existence of venereal disease, tuberculosis, alcoholism, drug habits, mental disease, epilepsy and hæmophilia would be invaluable to the practitioner in forming an opinion whether or not a person should be permitted to marry. Similarly a tendency to serious disease or the very early signs could be detected only by examining persons in apparently good health. The general practitioner should undertake certain forms of research. As examples of clinical research of this kind he cited the Hookworm Campaign in Australia, the diphtheria investigations, the Framingham experiment in connection with tuberculosis.

The public duties in regard to the prevention of disease were performed mainly by whole-time officials. Certain legal obligations were imposed on private practitioners. Complaints were made by the public health officials concerning the manner in which the private practitioners carried out the notification of infective diseases. The report of the Royal Commission on Health contained recommendations concerning other important duties which



the private practitioner could perform. These had been published and were well known. Dr. Cumpston had suggested that certain duties might be imposed by law on medical practitioners. They included the taking of swabs from diphtheria patients and contacts, obtaining verification of diagnosis in suspected enteric fever, the collection and forwarding of samples of faeces before release of patients after enteric fever, the inoculation of house and other contacts in connexion with the same disease, the investigation of the condition of house and family contacts in the presence of open tuberculosis. The whole of the practising portion of the medical profession could be used for infant welfare work, the prevention of puerperal mortality and the treatment of defects discovered during the examination of school children. He repeated a statement made by Sir George Syme to the effect that every conscientious practitioner helped in the prevention of disease as opportunity offered and maintained that it would be no great hardship to convert a moral responsibility into a legal one.

In regard to the proposals to require medical practitioners to furnish information for statistical purposes, the opinion had been expressed that such a duty would have a wholesome effect on the profession. The conscientious worker would learn the value of proper records, while the dilatory man would find himself compelled to improve his methods.

Dr. Morris found that in no published scheme had the part to be played by the general practitioner in his relations with the health district and the local supervising authority been defined. He held that it might be difficult to devise such a scheme, but not impossible. The independence of the private practitioner should not be disturbed and his preventive work should not be incompatible with his curative work. Reasonable remuneration for services rendered should be paid. In conclusion Dr. Newman Morris stated that the State had hitherto failed to interest the general practitioner in the preventive side of his work. A genuine request made to the medical profession to formulate a detailed scheme of prevention of disease would be sympathetically received.

Dr. M. H. WATT (Wellington) referred to the fact that the State took an active interest in preventive medicine, but was notoriously conservative. Any incursions made by the State into the domains of the private practitioner would be impelled by a crying need for reform. The private practitioner had an uneasy feeling that the activities of the State would eventually restrict his own activity. Opportunity had been knocking at his door unheeded. It was knocking and if the medical practitioner continued to ignore the summons, he could not complain if further inroads were made on his livelihood. The State registered the medical practitioner, provided that it received an assurance that his training was adequate and his conduct and character above reproach. Registration conferred on the registered person the right to use the title of doctor, to sign death certificates and other legal documents, to hold public appointments and to sue for fees. Unregistered persons could practise, but they could not do these things. The State imposed certain obligations on registered practitioners. The chief of these was the notification of notifiable diseases. Sir George Newman had stated that notification was the impulse which set the official health machinery in motion. If the appropriate machinery was lacking, notification was a waste of money.

In the past the private practitioner had been interested only in curative medicine. The orbit of the practitioner lay between his consulting room, the patient's home and the hospital. In the consulting room the practitioner had an opportunity of helping to prevent disease by emulating the idea of medical inspection of school children. He could carry out an annual examination of persons apparently in the best of health. He must give full value for the fee he received. The examination or overhaul must be thorough and skilful. In the home the doctor was concerned not only with his patient, but also with every other member of the household. In the event of diphtheria invading a house, he should be required to determine whether or no the other members were free from infection; he should advise them as to the precautions needed to avoid infection; he should immunize

them when necessary and so forth. In the case of tuberculosis he had duties to perform with contacts.

Dr. Watt then turned his attention to the New Zealand hospital system and the relationship between the profession and the hospitals. Private practitioners complained at times that the New Zealand hospitals were staffed by full-time medical officers and also that the State competed unfairly with them by permitting persons able to pay for private treatment to enter the hospitals. The first complaint was justified to some extent. But while it was in the interests of the community that the privileges of hospital practice should not be confined to a few full-time medical officers, the smooth and efficient working of the institutions placed a limit to the number of those engaged in this practice. The resident in any hospital district claimed that he had a right to admission to a public hospital. This principle was too deeply rooted to be readily overthrown. A compromise had been reached by the establishment of a few private beds in public hospitals. This met the difficulty to some extent, although it was unlikely that the number of beds available for paying patients would be considerable. There were as well the private hospitals at which ordinary patients could be accommodated at a rate cheaper than that charged at the public hospital. Dr. Watt urged the private practitioner to utilize the hospital freely. In the event of a difficult diagnosis, he should send his patient to hospital. This was done at the Johns Hopkins Hospital and at the Henry Ford Hospital. Patients were sent as out-patients to the former and as temporary in-patients to the latter. No treatment was undertaken. The diagnosis was made after elaborate examination and investigation and the result was imparted to the general practitioner. He claimed that the hospital should be the home of the intellectual life of the medical practitioner. He should attend for instruction and education. In conclusion Dr. Watt spoke of the bogey of nationalization. He interpreted this to mean the replacement of the private practitioner by full-time salaried medical officers paid out of the public funds. He maintained that this would not be in the interests of the community or of the profession. The intimate personal relationship between patients and their doctors was too strong a force to be destroyed by any specious demand for nationalization. The remedy for any existing ills was to widen the sphere of duties of private practitioners.

Mr. R. J. LOVE (Melbourne) as Inspector of Hospitals and Charities, spoke of the relationship of medical practitioners to hospitals from the non-medical point of view. In the first place he examined the position of the medical profession in relation to the hospitals. The matter had been discussed for years and a more or less satisfactory working arrangement had been evolved. There was, however, no uniformity and yet a uniform settlement of the question was necessary. He thought that the aim in the past had been to arrive at an ideal settlement. As this was practically unattainable under existing circumstances, a reasonable measure of relief should be accepted. It would be necessary to define the objective at which the medical profession aimed and he looked to the British Medical Association to make an announcement.

Medical practitioners alone of all professional men were expected to give and willingly did give a large amount of time and skill without fee or reward. The demands on the medical man could be enlarged until they amounted to exploitation. It was important to devise some means whereby medical practitioners might continue to give their services without seriously prejudicing their chances of earning an income reasonably commensurate with their special qualifications. He thought that the position might be summed up from the point of view of the public in the following manner. There should be ample hospital accommodation for treatment of the indigent sick where the best medical attention would be given freely and ungrudgingly. Those people who were able to pay full fees for hospital accommodation and medical attention, should do so without interference, provided that both parties received full value for money in the matter of service. Between these extremes there should be an arrangement whereunder every patient should obtain essential service without financial hardship or an undermining of his



independence or imposition practised on the doctor. One condition of Government subsidy to hospitals in Victoria was that the medical officer was not allowed to accept any fee for his services. The honorary service was given to the indigent sick. Mr. Love briefly recounted the advantages accruing to the doctor from these gratuitous services. At public hospitals there was provision for scientific investigation and treatment of the best kind which was practically unobtainable elsewhere even by the very wealthy. He glanced at the hospital statistics and discovered that in the course of twenty-five years the number of in-patients and of out-patients at public hospitals in Victoria had increased out of all proportion to the growth of the population. He came to the conclusion that the improper use of hospitals would increase still further unless facilities for treatment were widened and grades of hospitals established corresponding as regards cost with the respective grades of society.

In order to find a solution of the problem he suggested that the community for hospital purposes should be divided into four classes, private, intermediate, third and public or free. He defined the groups in a few words. Corresponding to this division of the community, he proposed that hospital accommodation should also be grouped. Private accommodation would be found in private hospitals, save in districts where the population and resources were limited. Intermediate accommodation could be provided either in independent hospitals, managed by church organizations, insurance companies or any body or corporation recognized by the controlling authorities or in public hospitals. It might be found in some of the private hospitals. Third class accommodation and free accommodation would be placed in public hospitals. The staff in private hospitals should not be limited in any way. At the intermediate hospitals the same arrangements should obtain. If community hospitals were established, the staff arrangements in the private and intermediate wards should be the same as in the analogous hospitals. The care of third class and free patients would be by elected staffs.

Mr. Love proceeded to develop the supplemental activities of public hospitals and pointed out that in many respects these activities were directed toward the prevention of disease. The private medical practitioner could take part in the services for the benefit of the community. He dealt with the tuberculosis dispensary, the department for overhaul, the auxiliary and convalescing unit, the social service department, the visiting nurses' depot, the antenatal clinic and the baby health centre. In addition he mentioned the dental unit. He urged active cooperation between private medical practitioners and the hospitals in carrying out a vigorous policy of preventive medicine.

Dr. T. McKIBBIN (Wellington) spoke of the advantages of compulsory national insurance. In New Zealand public hospitals had been used to an increasing extent; during the last fourteen years the proportion of the general public using hospitals had increased from twenty-four to forty-six per thousand of population each year. He claimed that for the purposes of preventing disease the general practitioner or health visitor should observe the home and working environment of the people. There were only ten medical officers of health in New Zealand. There were 1,211 registered medical practitioners in New Zealand and he thought that at least one-third of these could be utilized for the prevention of disease. The work in hospitals was mainly curative. During the past fourteen years the cost of hospital maintenance had risen from five shillings and eightpence to twelve shillings and tenpence per head of population. He claimed that it would be better to limit the expenditure and to divert the money to preventive work.

Dr. McKibbin disapproved of the part-time medical officer of health. The hospital boards throughout the Dominion made one hundred and fifty-one stipendiary appointments of medical practitioners in public hospitals in 1926. Although the friendly society system was extensive in New Zealand, it touched only the thrifty. National insurance operated on the whole community. After discussing the schemes in existence in England and elsewhere he came to the conclusion that it paid the panel practitioner to endeavour to maintain the health of his insurance patients. If national insurance were introduced

into New Zealand the hospital boards would be represented on the committees and their machinery would be used. The boards were responsible for the medical and nursing treatment of indigent persons in their respective districts and it would be logical and expedient for them to promote insurance against sickness. In conclusion Dr. McKibbin suggested that the medical profession should declare its policy in regard to national health insurance.

Dr. HARVEY SUTTON (Sydney) thought that Dr. Morris was pessimistic in his views concerning the interest the general practitioner and medical student took in preventive medicine. The general practitioner was in the front line in the national campaign of disease prevention. Preventive medicine was occupying a more prominent place in the medical curriculum and in the forefront of that teaching was upheld the value of the human factor in disease prevention. Public health had become more personal in its application; it dealt more directly with the individual and as a result a greater interest was being taken in this phase of medicine. Students, medical practitioners and nurses of the very best type and with the highest qualifications were turning their thoughts to prevention and there were many applicants for public health vacancies.

In the great war emphasis had been placed on prevention; lessons learned in war time had not been forgotten and preventive medicine had remained in the forefront. The public believed in surgery as a specialty only and were asking that specialists should restrict their practice exclusively to that calling. The people were beginning to realize that the real attack on disease lay in prevention rather than cure. Annual examinations and overhaul were instituted in schools and were coming more and more into general favour with adults. An annual thorough overhaul to detect disease in its incipience was an immediate practical proposal and an advisable measure.

Dr. Sutton thought that if New Zealand utilized ten medical officers of health in her organization Australia in respect of her size and population should be employing more than she was at present. In the large Australian towns and cities the campaign against disease was well conducted and the hospitals efficient and well run, but in the country districts improvement was badly needed. Their hospitals were poorly conducted, especially the children's departments. He called attention to the conditions at one hospital with an ophthalmic department at which refraction work was not undertaken. In the campaign against disease in war time prevention became all-important. Surely in peace time it was as urgently in need of emphasis. If more peace time energies were directed into the channel of preventive medicine, the public would be better off.

Dr. S. A. MOORE (Dunedin) agreed with Dr. Harvey Sutton that the attitude of practitioners towards preventive medicine was a live one. They were not as indifferent as Dr. Morris thought. A live interest did not adversely affect the practitioner's living, rather the opposite. Certainly the standard of health would be raised. In New Zealand there was one form of medical treatment undertaken by the State in which the cooperation of the community in the State effort was urgently needed. It was the mental hospital service which lacked voluntary workers and contributions. It was claimed that the New Zealand hospital system was successful by virtue of the inclusion of voluntary effort and finance.

In regard to preventive work Dr. Moore agreed that periodic examination was well worth while. He thought that after patients left hospital they should be more closely followed up. There should be a branch of service visiting the homes to discover why people had fallen ill. The increased hospital attendance by the people had resulted in less home visitation. The general practitioner should endeavour to get back into the home and study the environment. The clinician had started preventive medicine; the public health expert should have to come to the practitioner for help in preventive medicine and not *vice versa*. By getting back into the homes the practitioner would again take his rightful place.

Disease was capable of classification into two groups, the biologically old, to which resistance had been evolved and the biologically new towards which resistance was



still undeveloped. The biologically new would be prevented by discovery of the virus. The biologically old might be prevented by further study of the soil in which the virus had thrived. Rules of hygiene were of great importance and more must be known of the fundamental principles of diet.

Dr. Newman Morris in reply did not wish to be pessimistic, but maintained that the preventive aspect of medicine did not pervade the medical course as it should. He referred to the reports of the General Medical Council and others upon the need for reform in this matter.

He admitted that periodical examinations were being carried out upon children by paid school medical officers, but held that this work should be done by general practitioners and might well be restored to them.

Legislation was being proposed and might shortly be passed in Australia linking up general practitioners more closely with the Public Health Department. Dr. Morris advised the practitioners to guide this movement and to take a lead therein, otherwise their future closer cooperation might prove irksome.

#### THURSDAY MORNING, FEBRUARY 10, 1927.

##### GENERAL MEETING.

A general meeting was held in the Allan Hall, University of Otago, on the morning of Thursday, February 10, 1927. Dr. L. E. Barnett, the President, in the chair. There were forty-nine members present.

Dr. L. E. BARNETT said that the meeting was the final meeting of the second session of the Australasian Medical Congress (British Medical Association). It was not actually essential to hold this meeting, but they had considered it advisable in conformity with a kind of tradition. He explained to the members that the meeting had no power to adopt resolutions such as had been passed at the old Australasian Medical Congresses. The Congress was held under the aegis of the Federal Committee of the British Medical Association in Australia. All the resolutions which had been adopted in the Sections, would be remitted to the Executive Committee and thence to the Federal Committee. The meeting would be of an informative character and opinions expressed would be used to guide the members of the Federal Committee in arriving at their decisions. Before calling upon the Honorary General Secretary to read the resolutions adopted in the Sections, he announced that he had received a cable from the South African Medical Association conveying fraternal greetings to the Congress.

PROFESSOR W. P. GOWLAND, Honorary General Secretary, read the following resolutions.

##### From the Combined Meeting of the Sections of Surgery, of Radiology and of Pathology and Bacteriology.

That legislation should be introduced in Australia to make hydatid disease notifiable and that there should be stricter attention paid to notification in New Zealand.

That there should be greater control of slaughter houses, especially in regard to the boiling of offal and the exclusion of dogs. Public propaganda should be promulgated as much as possible. On registration of dogs full information should be given as to the importance and prevalence of the disease and the mode of infection. The importance of vermifuges should be made clear especially to those of the farming community.

##### From the Section of Pathology and Bacteriology.

That it be recommended to the governing bodies of those Universities of Australia which have medical schools, that chairs of bacteriology to include immunology would further medical research, medical education and the public health.

##### From the Section of Naval and Military Medicine and Surgery.

1. That the medical tactical exercise (staff ride) be continued in subsequent sessions of the Australasian Medical Congress (British Medical Association).

2. That at future sessions of the Australasian Medical Congress (British Medical Association) the papers presented at the Section of Naval and Military Medicine and Surgery should be diminished in number in order to permit members to attend the meetings of the other sections.

3. That Lieutenant-General Sir H. J. C. Goodwin be congratulated on his elevation to the rank of Governor of Queensland.

##### From the Section of Ophthalmology.

That this meeting is of opinion that since a medical and special training is required:

- (i.) It is not in the public interest to register and recognize sight testing or consulting opticians as such;
- (ii.) There is no objection to registration of dispensing opticians and the medical profession would cooperate with the opticians to promote scientific training and registration of such.

##### From the Section of Neurology.

1. That the Section of Neurology and Psychiatry of the Australasian Medical Congress (British Medical Association) recommends Congress to approve of the formation of separate Australian and New Zealand councils for mental hygiene on lines similar to the British Council for Mental Hygiene, having the following objects:

- (i.) To work for the conservation of mental hygiene; to promote the study of and to obtain and disseminate reliable data concerning the causation and prevention of mental disorders, defects and disturbances,
- (ii.) To encourage, correlate and organize means of communication between societies, associations and other bodies interested in or concerned with mental hygiene,
- (iii.) To cooperate with societies, associations or other bodies interested in or concerned with mental hygiene and to promote an international league of national councils for combined action and interchange of knowledge concerning mental hygiene,
- (iv.) To further the establishment of special clinics for the early treatment of mental disorders and generally to work towards effecting improvements in the conditions of treatment of mental disorders and defects in whatsoever way the Association shall determine.

2. That the President of the Congress be asked to nominate an organizing committee for Australia and an organizing committee for New Zealand which will have power to draft constitutions for the respective mental hygiene councils, and to take the necessary steps to have the councils duly established.

3. That the diagnosis, educational and other treatment of mental defectives and the activities in this regard of non-medical psychologists and of teachers should be under medical psychiatric control.

##### From the Section of Preventive Medicine.

1. The Committee set up by the Section of Preventive Medicine to consider the work and training of the public health nurse have met and suggest that Congress pass resolutions to the effect:

- (i.) That a fully qualified and properly trained nurse is an important link in the public health machine,
- (ii.) That the public health nurse in addition to her ordinary nursing and midwifery qualifications should be the possessor of a certificate for post-graduate study in public health nursing,
- (iii.) That from the point of view of status and training it is desirable that this course of instruction should be given at the University medical school.
- (iv.) That for these reasons this Committee recommends the respective Governments of Australia and New Zealand to inaugurate such schemes for the training of public health nurses.



2. The Committee set up by Congress to advise as to any recommendations to legislature with regard to the prevention of goitre have met and their considered opinion is that Congress should pass the following resolutions to the following effect:

- (i.) That a recommendation to the Government of New Zealand that on account of the undisputable evidence as to the undue incidence of goitre in New Zealand as a whole and more particularly in certain areas, active propaganda should be undertaken by the Department of Health, in cooperation with the medical profession, with a view to increasing the use of all purposes of iodized salt standardized according to Regulation 51.4 of the Regulations of the *Sale of Food and Drugs Act*.
- (ii.) That the attention of the medical profession be drawn to the unmistakable increase in toxic goitre in New Zealand, as shown both by returns of death and admissions to hospital and that emphasis be laid on the need for conservation in the therapeutic use of iodine for the treatment of simple goitre in adults.
- (iii.) That owing to the grave dangers attending the use of large quantities of iodine in goitrous districts, it is a recommendation to the Government of New Zealand that the sale of so-called goitre remedies should be illegal, save by chemists on the prescription of a doctor.

DR. L. E. BARNETT asked the members present to make comments in order that when the Executive Committee, the Federal Committee and the several bodies to which these resolutions might be sent, considered the matters, the opinions expressed at that meeting might also be taken into account. There was no response to Dr. Barnett's invitation.

PROFESSOR W. P. GOWLAND asked the meeting to consider the question of the title of the Congress. The Dunedin Chamber of Commerce had for many years adopted the view that the term Australasian was objectionable and should be replaced by the terms New Zealand and Australia. As a result of their activities many New Zealand institutions had adopted the alteration. In particular the Australasian section of the London Chamber of Commerce had altered its title to the section for Australia and New Zealand. It was argued that the identity of New Zealand is almost entirely lost in the term Australasia. The Chamber of Commerce suggested that Congress should consider the advisability of altering its name. In conclusion the writer of the letter offered the congratulations of the Chamber of Commerce on the occasion of the meeting of Congress in the city of Dunedin.

DR. L. E. BARNETT expressed the opinion that from a commercial point of view there was excellent reason to keep New Zealand and Australia separate in fact and in terminology. The use of the term Australasia in commerce had had the effect of leaving New Zealand out in the cold. It was a different matter, however, in regard to a scientific body. Science knew no nations and no boundaries; they as scientists aimed at the closest possible cooperation. There was a very friendly feeling existing throughout the Commonwealth and the Dominion and for this reason he did not think it wise to make any change. He asked those present to express their opinions in order that the Executive Committee might have guidance.

PROFESSOR A. M. DRENNAN recalled the original name of the Medical Congress, the Intercolonial Medical Congress, and asked whether there was any valid reason why recourse should not again be had to this name.

DR. A. JEFFERIS TURNER stated that this was a matter for the New Zealand members, it did not concern the Australian members; he thought that it might be left to the Executive Committee to consider and to take any action that was thought necessary.

DR. J. NEWMAN MORRIS reminded the members that the constitution of the Congress was in the hands of the Federal Committee and moved that this matter should be

referred to the Federal Committee for consideration and action.

DR. F. R. RILEY hoped that others would express their opinion as to the desirability or otherwise of retaining the present name of Congress. He would not like to see it altered.

DR. W. B. MERCER seconded Dr. Newman Morris's motion.

DR. F. S. BATCHELOR held that it would be better to alter the name from Australasian to something else. He found that Australian and New Zealand would render the title too long and clumsy.

DR. J. A. POTTINGER considered it would be unwise to refer the matter to an Australian committee. New Zealanders were the only aggrieved parties. He did not think that the old title Intercolonial could be resurrected, it was as dead as mutton and no longer had any significance.

PROFESSOR A. M. DRENNAN moved as an amendment that the matter be referred to the Executive Committee of Congress. If the Executive Committee decided to recommend an alteration in the name of Congress, the matter could be referred to the Federal Committee.

DR. D. W. CARMALT JONES, in seconding the amendment, said that the opinions expressed at that meeting should not be regarded as of sufficient importance to be a guide to the Executive Committee because the meeting was not large enough.

DR. NEWMAN MORRIS stated that he was prepared to withdraw his motion, but Dr. Mercer disagreed.

DR. R. H. TODD pointed out that the difficulty of the meeting was merely a matter of procedure. The Federal Committee acted on behalf of the Branches of the British Medical Association and when any matter concerned one Branch, the Committee would certainly refer it to that Branch. He thought that this question was one for the New Zealand Branch of the British Medical Association to decide. The New Zealand Branch could handle it properly and in a perfectly constitutional manner. He recognized, however, that the Executive Committee actually represented the New Zealand Branch and it would therefore have the same effect if the matter were referred to the Executive Committee of Congress as if it were referred to the Council of the Branch.

The amendment was put to the meeting and carried and was also carried as a substantive motion.

#### The Finances of Congress.

DR. L. E. BARNETT called upon Dr. Carmalt Jones to lay before the meeting some proposals that he had to make in regard to the financial arrangements for sessions of Congress.

DR. D. W. CARMALT JONES said that the finance of the present Congress had been a matter of grave anxiety to those concerned. Very moderate estimates had been made, the lowest which could possibly be held to cover expenses, but it had been only within the last few weeks that these estimates had been reached. Had they not been reached, it would have been necessary to resort to special appeals, levies and the like, which were unpleasant for all parties. It appeared that this could be obviated by a very simple and unburdensome procedure.

The State or Dominion which accepted the responsibility for the next or for any future Congress, would do so only on one condition, namely, that all members of the British Medical Association in the State should become members of Congress. This would have to be agreed to by a majority of a meeting of properly instructed delegates called for the purpose. Thus the Branch of the British Medical Association of the State, not a number of independent members thereof, would undertake the Congress. If a majority vote in this direction was not obtained, the Congress would not be held by that State.

When a State agreed in this way to hold the Congress, a sum of three guineas would be charged to all members of the Branch. This would be distributed over three years, by the addition of one guinea *per annum* to the annual subscription for that period.

Two guineas would cover membership of the Congress and would go to the ordinary Congress fund; this would



secure adequate funds for the Congress and would permit the Executive Committee to make arrangements in accordance with a settled budget. One guinea would go to an entertainment fund; the establishment of such a fund would be at the discretion of the Branch.

If this arrangement were adopted, the value of the Congress could be enhanced in the following direction. Considerably more money would be paid in than would be required for the needs of the actual meetings and a sum would be available to provide the finance for research into subjects of interest to future sessions of Congress.

A plan might be adopted to distribute the four days of session broadly: One day to be given to a subject of special interest to the State holding the Congress, one day to be given to a subject of special interest to Australia, one day to a subject of general interest, one day to the presentation of independent new work. The available money could be expended in research on any subject which might be selected out of these alternatives. In this connexion it would be advantageous to select the State to hold the Congress six years in advance. If this had been agreed upon, the place of meeting for 1930 would have been selected at Melbourne at the end of 1923 and that for 1933 would be selected at the Dunedin meeting. The reason for this was that the period of three years was insufficient for the selection and completion of any important piece of research.

A concrete instance of what was suggested, was that if this scheme had been started at the Melbourne Congress, the venue for 1930 would have been selected in 1923, they might suppose in some imaginary North Australian State, North Australia would have been "warned" for a Congress in 1930. During the first three years, under fairly constant pressure from the Federal Council, North Australia would have considered its problems and decided that malaria was its chief menace. It would have decided that the entomology, protozoology and drainage required investigation and it would have made arrangements with experts to undertake the work. It would produce concrete proposals at that session of Congress, at which the available money would be voted to it and a report on the work done would have to be presented at the next meeting.

There were, of course, many alternatives to this disposal of the money according to the amount available; it might be decided to import experts to address the next Congress or to elect scholars for research locally or abroad and so forth.

There were about eleven hundred members of the Victorian Branch; universal membership would have brought in about £2,250. The Congress cost about £2,000 and there would have been available all the subscriptions of members from other States; probably at least £1,000 would have been available for research.

There were two quite separate proposals contained in these suggestions: (i.) That the finance of future sessions of Congress be assured by the acceptance of membership by all members of the British Medical Association of the Branch concerned; (ii.) that the surplus funds be devoted to research on some subject which the State concerned would have three years to select and three years to execute.

#### The Visitors.

In response to an invitation from the President, Dr. COOPER PATTIN said that he was greatly indebted to Dr. Barnett for having given him the opportunity of addressing the meeting on behalf of the visitors. This privilege had come to him because he had travelled the longest distance to attend the Congress. He referred to the magnificent hospitality which had been extended to them by their Dunedin colleagues. It had been a delightful experience. Some years ago Dr. Dawson Hill had told him that if he did not live in England, he would prefer to live in New Zealand and Dr. Cooper Pattin agreed with Dr. Dawson Hill. Although he was a bachelor, he did not hesitate to extend his expressions of thanks to the ladies who had entertained the lady visitors in a most charming and lavish manner. He wished to congratulate the members of the Executive Committee on the very efficient manner in which

they had conducted and arranged the meetings. He spoke enthusiastically of the urbanity and charm of the President and of the extraordinary ability of the Honorary General Secretary. When he returned to England he would suggest to the British Medical Association that they should create the position of a permanent peripatetic delegate to congresses and that they should appoint him to that position.

Dr. L. E. BARNETT thanked Dr. Cooper Pattin for his kind expressions and for his appreciation. When he wrote to Dr. Alfred Cox, the Medical Secretary of the British Medical Association, he would not forget to inform him that the Australasian members of the Congress appreciated the quality of the representative who had been sent out to them. Dr. Barnett said that there were many votes of thanks that would have to be considered by the Executive Committee. He would not attempt to enumerate the individuals to whom they were so much indebted. He thought that the members would like to know that the list would be carefully prepared and an appreciative letter would be addressed to each one.

Very warm tributes were extended to Professor Gowland, Professor Drennan and Dr. Carmalt Jones. It was announced that the appreciation of the New Zealand members would take a tangible shape and that a souvenir would be presented to each of them in recognition of their magnificent services.

#### RADIOLOGY.

A special meeting was held on Saturday, February 5, 1927, at which Mr. E. JERMAN, M.I.E.E., gave a short history of the foundation of the Education Department of the Victor X Ray Corporation. Some twelve years previously he had been working for a clinic and, unsatisfied with his technique, had commenced a tour of the States in order to learn more of radiography. At each laboratory he had been disappointed as the workers were either unwilling or unable to give him any definite information. He realized then it would be an advance if radiography could be taught. His proposals to the medical schools had fallen on stony ground and he had been a disappointed man until two years later when the Victor Company formed their education department with the speaker as its chief, for the purpose of getting better results from their apparatus. This department had grown until there were branches situated even in foreign countries.

He admitted that a great deal of X ray diagnosis could be done with very average films, but that high quality was necessary in an increasing number of cases in order to determine the exact nature and extent of a lesion. Generally speaking the better the quality of work, the greater the information that could be obtained. All radiologists should aim at a high standard obtained by a set routine production. This enabled the company to lend more assistance where necessary. The requirements of a laboratory were laid down as follows:

#### Equipment.

A machine should be chosen capable of delivering the required energy. Speed work with sufficient contrast demanded a machine of sufficient capacity and power. The tube also required capacity.

But of more importance even than capacity was the control. It was useless to have a machine of great capacity unless the current could be fully controlled. In the production of a good X ray film four factors came into play: distance, time, milliamperage and the gap. Distance was, of course, easily controlled. In fractional work a properly constructed time switch was necessary. There was no time switch made that was perfect. In regard to milliamperage fluctuation on a line was magnified twenty times on a film. A stabilizer insured that this magnification of fluctuation was abolished and the variation reduced.

There was no such thing as a four or a five inch spark gap. The gap was one of the most difficult problems. The spear gap method was the most efficient way of measuring the voltage. This insured uniform calibration of all machines.



The Victor Corporation guaranteed a good diagnostic result. Mr. Jerman suggested that with double screened Eastman films and a Potter-Bucky diaphragm a good picture could be taken with a milliampere of ten, a kilovoltage of 85, a six seconds' exposure at a distance of ninety-one centimetres (thirty-six inches). By varying these factors any quantity of contrast could be put into a film.

But, in spite of having the best equipment, results were not assured without good technique, technicians were a necessity. They had arrived at an almost perfect film by using good equipment with almost perfect control manipulated by excellent technicians. The third factor, interpretation, had come into being.

Turning from the laboratory to the film, he spoke of the end result, the "puzzle picture." Short time work eliminated heart action and peristalsis and contrast could then be added. This was especially useful in some work, namely that on the gall bladder.

There were four factors needed for a good film. In the first place there should be a minimum of distortion; this was either true or magnified, but the latter was not a serious defect. The second essential was detail, as representing the contour lines. These should be clean cut, sharp and distinct. This was especially necessary in the early stages of disease to ascertain its nature and extent. Detail could be obtained by altering the distance of the object and the tube from the film and by the alignment and the size of the focus spot. The focal spot for each tube was recorded before it left the factory. The third point of importance was contrast which was defined as the percentage difference between the extreme whites and blacks of exposed areas. It was possible to produce films with a soot and whitewash appearance. Furthermore by increasing the time and decreasing the gap greater contrast could be produced. Lastly radiographic density meant the general density as regards light or darkness.

Mr. Jerman made no attempt to advocate a different technique for certain pictures as radiographers obtained good results with very varying technique. This was possibly on account of the fact that individuals required films with certain features; generally speaking technique was becoming more standardized in America.

One variable factor that was unavoidable, was the patient; this thwarted perfect results owing to a variable resistance of the body caused by mineral substances and fluids in the tissues. On this account the first exposure was very often a guess.

In conclusion Mr. Jerman appealed for cooperation between the manufacturers, radiographers and radiologists in an attempt to keep track of events. He prophesied that it would not be long, perhaps five years, before a New Zealand radiologist would deliver an address in America.

Experiments were being carried out on new and powerful rays in their laboratories—rays so powerful that tubes generating them could not be sent out.

The Victor Corporation welcomed suggestions from radiologists; as high a standard as possible should be aimed at and the watchword for all should be cooperation.

In reply to a question Mr. Jerman pointed out that more detail was obtained without screens, but that greater contrast followed their use.

## University Intelligence.

### THE UNIVERSITY OF SYDNEY.

A MEETING of the Senate of the University of Sydney was held on Monday, March 7.

The degree of Master of Surgery (Ch.M.) was conferred *in absentia* on Thomas Russell Pearce.

Regarding an invitation from the University of Louvain asking the University of Sydney to be represented at the Fifth Centenary of that University in June, 1927, it was decided to forward thanks and congratulations and to

express regret that it was not convenient to nominate a delegate to attend the celebrations.

The University Diploma in Tropical Medicine was awarded after examination to Dr. N. B. Watch.

The following dates were fixed for the Ceremonies of Matriculation, and Conferring of Degrees this year: Matriculation Ceremony, Tuesday, April 5; Conferring of Degrees, Saturday, April 30.

The following were appointed Examiners for the Peter Bancroft Prize: Professor Welsh, Professor A. E. Mills, Professor Burkitt or Professor Stump.

The following appointments were approved:

Dr. J. E. V. Barling as part-time Demonstrator in Pathology; Mr. Ivor Callen, B.Sc., as Demonstrator in Organic Chemistry; Messrs. W. L. Price, B.Sc., J. Bannon, J. D. McGee, and Miss P. M. Nicol, M.Sc., as Demonstrators in Physics; Miss M. L. Garde as Assistant to the Professor of Anatomy in the Department of Histology.

### MACDONALD PRESENTATION FUND.

THE following subscriptions to the Macdonald Presentation Fund have been received since last week.

	£	s.	d.
Richard Green, Esquire	5	5	0
Dr. Keith Inglis	5	5	0
Medicine V., per R. J. Waddington, Esquire	4	10	0
Dr. F. A. Maguire	3	3	0
Professor A. E. Mills	3	3	0
Laboratory Staff, Health Department, per A. Duffy, Esquire	2	5	6
N. S. Bartlett, Esquire	2	2	0
Dr. J. A. James	2	2	0
Dr. C. Norman Paul	2	2	0
Professor F. P. Sandes	2	2	0
Drs. Webb, Stokes and Shute	2	2	0
Dr. Mary C. Puckey	1	2	0
Dr. Idris Morgan	1	1	6
Dr. W. T. Nelson	1	1	6
Dr. C. R. Palmer	1	1	6
Anonymous	1	1	0
Dr. H. G. Allen	1	1	0
Dr. Charles Badham	1	1	0
Dr. Edith Allard Beale	1	1	0
Dr. A. S. Boyd	1	1	0
Dr. Bernard Coen	1	1	0
Dr. A. J. Collins	1	1	0
Dr. H. G. Douglas Cookson	1	1	0
Dr. M. R. Finlayson	1	1	0
Dr. W. Watson Feather	1	1	0
Dr. Francis H. Genge	1	1	0
Dr. A. J. Gibson	1	1	0
Dr. T. M. Greenaway	1	1	0
Dr. N. M. Gregg	1	1	0
Dr. Margaret Harper	1	1	0
Dr. H. M. Hollingworth	1	1	0
W. Jamieson, Esquire	1	1	0
G. L. King, Esquire	1	1	0
Dr. G. H. S. Lightoller	1	1	0
Dr. Bennett Little	1	1	0
Dr. W. McDonald	1	1	0
Dr. Yorke E. Pittar	1	1	0
Professor H. Priestly	1	1	0
Dr. Harold Ritchie	1	1	0
Dr. Doris W. Squire	1	1	0
Dr. P. E. Walton Smith	1	1	0
R. Smith, Esquire	1	1	0
W. M. Still, Esquire	1	1	0
Dr. Clifton Walker	1	1	0
Dr. A. M. Walsh	1	1	0
J. Finlayson, Esquire	0	12	0
Dr. W. Roy Wilson	0	11	0
H. Clarke, Esquire	0	10	6
R. Clarke, Esquire	0	10	6
Dr. E. W. Fitzpatrick	0	10	6
Dr. M. B. Fraser	0	10	6
Dr. L. Mansel Fraser	0	10	6
Dr. Raymond A. R. Green	0	10	6



	£	s.	d.
— Harrigan, Esquire .. .. .	0	10	6
Dr. W. Moppett .. .. .	0	10	6
R. Muir, Esquire .. .. .	0	10	6
V. Wright, Esquire .. .. .	0	10	6
Dr. Athol Quayle .. .. .	0	10	6
G. Birmingham, Esquire .. .. .	0	10	0
P. C. Evans, Esquire .. .. .	0	10	0
G. W. Sinclair, Esquire .. .. .	0	10	0
W. Small, Esquire .. .. .	0	10	0
Sums under 10s. .. .. .	3	0	0
Amount previously acknowledged .. .. .	147	7	0
Total .. .. .	£229	3	6

## Correspondence.

### THE WORKERS' COMPENSATION COMMISSION OF NEW SOUTH WALES.

SIR: The following notes may be of interest to your readers in view of the remarks made by the Chairman of the Workers' Compensation Commission, His Honour Judge Perdriau, on Tuesday, March 1, 1927, when delivering judgement in connexion with the matter of a determination between John Mathew Bunster Robinson and the Newcastle and Hunter River Steamship Company, Limited.

I was called in by Dr. R. A. Eakin on August 31, 1926, to see Mr. J. M. B. Robinson, an inmate of Jenner Private Hospital, who gave the following history: On Thursday, August 26 at 12.15 he was standing at the hatch of s.s. *Archer* and put his right hand on a sling containing four tons of steel. The sling swung backwards and squashed his right hand against the moulding of the bridge. He was taken by the ambulance to Sydney Hospital and had his right hand swabbed with iodine and several stitches inserted into his middle finger. On August 27 the finger was reexamined radiologically, a fracture was diagnosed and a splint was applied. On August 28 the wound was found to be septic, the splint was removed, the stitches taken out and two antiseptic baths a day were ordered. He attended Sydney Hospital on the morning of August 29, but was too ill to attend further. He called in Dr. R. A. Eakin in the afternoon of August 29 and was found to have a temperature of 103° F. and his removal to hospital was advised. On the morning of August 31 his temperature was 100° F. and his pulse rate was 96. There was a lacerated and contused wound on the palmar aspect of the middle finger of the right hand, about one inch long over the first phalanx which exposed the flexor tendons one of which had been stitched. Suppurative tenosynovitis was present and pus could be expressed into the wound from both proximal and distal portions of the sheath. There was a fracture of the base of the second phalanx and the joint which communicated with the suppurating tendon sheath, presented septic arthritis. The finger was enlarged to the size of a sausage and had not only displaced the index and ring fingers, but had given rise to pressure sores on the adjacent skin surfaces. There was marked inflammatory oedema of the whole of the forearm which was enlarged to twice its normal size. The axillary glands were enlarged, tender and matted. In spite of four-hourly antiseptic baths, fomentations *et cetera* neither the general nor local conditions of the patient improved.

On September 6 that portion of the flexor tendon exposed in the wound had sloughed and the suppurating interphalangeal joint was exposed. The temperature was 100° F. and the pulse rate 84. Collections of pus were forming on the dorsum of the interphalangeal joint and in the palm at the base of the finger.

Three inch incisions were made along the dorsal and ventral aspects of the finger to allow of free drainage and thus to obtain a reduction of the virulence of the infection. The patient was given peroxide baths twice daily and had the finger dressed every six hours. By September 22 the general and local condition of the patient had greatly improved and fomentations were applied every three hours to clean up the finger prior to amputation.

On September 27 the finger was amputated at the metacarpophalangeal joint by a modified racquet incision, the wound being left open and packed with gauze. The swelling and oedema of the hand rapidly subsided, but wound repair was sluggish. On October 6 the root of the finger became inflamed and tender and was treated at first by three hourly fomentations and subsequently by hypochlorite dressings. On October 16 an abscess had formed in the distal part of the palm around the cut end of the flexor tendons and this was opened and packed.

When discharged from hospital on October 25 the wound was still unhealed, but the discharge of pus had practically ceased. There was redness and tenderness of the skin covering the head of the third metacarpal bone.

On Saturday afternoon late in November I saw the patient having lunch with a fellow member at the Australian Golf Club. The redness and tenderness over the head of the metacarpal had then considerably diminished. On December 3, 1926, the wound was soundly healed, but there was still tenderness over the head of the metacarpal bone and there was a painful point at the base of the lateral flap.

On giving evidence before the Workers' Compensation Commission on January 27, 1927, I stated that in my opinion the efficiency of the hand had been reduced by 40%; 25% by the loss of the finger and 15% through inflammatory and other causes.

I enclosed a copy of my account. It will be noted that I had already made a reduction of £9 17s. in connexion with this account. His Honour Judge Perdriau assesses my services at £10 10s.

Yours, etc.,

H. C. RUTHERFORD DARLING.

229, Macquarie Street, Sydney,  
March 7, 1927.

According to the account of the hearing before His Honour Judge Perdriau, Chairman of the Workers' Compensation Commission of New South Wales, published in the press, it would appear that a claim was made by Dr. R. A. Eakin for fifteen guineas, by Dr. Rutherford Darling for twenty-five guineas, by the Jenner Private Hospital for £41 12s. 6d. and by Sharpe's Pharmacy for £4 0s. 9d. in regard to attendance and hospital fees extending over a period of two months. Judge Perdriau reduced the amounts to seven guineas for Dr. Eakin, ten guineas for Dr. Darling, £16 4s. for the hospital and £1 18s. 6d. for the pharmacy. In delivering his judgement he stated that it was clear from the evidence that the doctors had simply acted on the view that they could visit the patient as often as they desired and the respondent would have to pay for these visits. The extent of these two doctors' interests in the patient was evidenced by the fact that after treatment on this lavish scale one had informed the Commission that the applicant's hand was only 50% efficient, while the other estimated the efficiency at 60%; to restore efficiency to the hand a further operation was required. Excessive was the mildest term which could be used in describing these accounts.

The following is a copy of the account rendered by Dr. H. C. Rutherford Darling.

August 31, consultation .. .. .	£2	2	0
September 6, opening whitlow .. .. .	3	3	0
September 27, amputation .. .. .	5	5	0
October 16, opening abscess .. .. .	2	2	0
September 1, 2, 3, 4, 5, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 20, 22, 24, 26, 28, 29, 30, October 1, 2, 4, 5, 6, 8, 10, 12, 14, 18, 20, 22 (thirty-six visits) .. .. .	22	10	0
Total, say .. .. .	£26	5	0

### THE RED-BACKED SPIDER BITE.

SIR: The records of bites from red-backed spiders in the medical press are infrequent. Dr. Miles's letter in your last issue prompts me to record a case which may be interesting to your readers.



Many years ago, when railway communication north of Brisbane did not exist, in a country district about fifty miles from this city, a little boy, about three or four years of age, complained that something, was biting him in the groin. His little pants were removed and a red-backed spider was found and killed. The patient was received into the Brisbane Hospital eighteen hours after having been bitten. On examination there were two punctures about half an inch apart from one another, very similar to the punctures made by the bite of a wasp that is common in this district. The child was dull and heavy, but not, so far as I can remember, complaining of any great distress. Death ensued within thirty-six hours at most after admission. *Post mortem* revealed no other conditions than an enlargement and intense engorgement of the chain of glands lying alongside the spinal column and existing at least as high as the diaphragm.

I have never seen any case of well-authenticated spider bite during the forty years which have since passed.

I have noticed occasional records of such things in the daily press, but I do not remember any deaths having occurred, except in children. I apprehend that that, of course, is to be explained by the relation of the dose of poison to the body weight of the individual bitten. It will be noticed by your readers that in the case I am recording the little patient had probably had two doses of the virus, administered in two bites by the spider.

Yours, etc.,

E. S. JACKSON.

St. Helen's Hospital, South Brisbane,  
March 7, 1927.

#### THE ARGYLL-ROBERTSON PUPIL.

SIR: Since my article on the Argyll-Robertson pupil appeared in your journal, I have been asked to explain why, in postdiphtheritic paralysis involving the eye muscles the reverse of this phenomenon occurs, namely that there is reaction of the pupil to light, but not to accommodation. This is what is to be expected according to the hypothesis put forward in my article and offers still further evidence to substantiate it. For as the eye muscles are paralysed, they can no longer be the source of afferent impulses and consequently there should be no reflex movement of the pupil on accommodation.

As some of your readers will no doubt be interested in the matter, I thought perhaps you would be good enough to bring it before their notice.

Yours, etc.,

H. J. WILKINSON.

The Anatomy Department,  
The University of Sydney,  
March 15, 1927.

#### MENDEL AND GENIUS.

SIR: It is interesting to learn from Dr. Taylor that Mendel "could have had no conception of the ultimate development" of his own law.

No doubt also Dr. Taylor's unique views on the origin of religious beliefs would be interesting to those who could understand them.

But before this correspondence closes I am, I think, entitled to an answer to the question I have asked in each of my previous letters, which question was my sole reason for entering on this correspondence and which Dr. Taylor has not attempted to answer.

I repeat again: "What tenet of Mendel's faith is threatened by the practical application of Mendel's law?"

If Dr. Taylor would just quote the doctrine without giving his own theories of its practical application, I would find it less confusing and less likely to cloud the issue.

Yours, etc.,

H. B. OXENHAM.

Leichhardt, New South Wales,  
March 11, 1927.

#### RAMISECTION AND VISCEROPTOSIS.

SIR: In view of Dr. Royle's absence abroad, may I comment on Dr. Southwood's letter *re* the effect of ramisection on visceroptosis.

To save argument I will concede his point as to the importance of the tone of the muscles enclosing the abdominal viscera in this condition and pass on to his concluding sentence.

He writes: "Is it not probable, then, that sympathetic ramisection would reduce the tone of the muscles of the abdominal wall and so aggravate visceroptosis rather than cure it?" I presume he refers to the operation of lumbar ramisection described by Royle in the "Murphy Oration," 1924 (*Surgery, Gynecology and Obstetrics*, December, 1924) and the modification for the cases of Hirschsprung's disease as reported in *THE MEDICAL JOURNAL OF AUSTRALIA*, January 29, 1927. The point of importance is that in these operations the only effect possible of the nature suggested on the abdominal wall muscles would be through the destruction of sympathetic fibres to the first lumbar nerve thus depriving the ilio-hypogastric and ilio-inguinal of portion only of their sympathetic element. The effect on the tone of the whole musculature of the abdominal wall by the interference with innervation of so small a part could scarcely be appreciated and as a matter of practice is not at all.

On the other hand the effects of ramisection as noted in Hirschsprung's disease would certainly be expected to allow the muscles in question to recover tone (as it is generally understood) by the removal of the constant stretching caused by gut distension.

Yours, etc.,

J. HOETS.

143, Macquarie Street, Sydney,  
March 1, 1927.

#### THE INTRODUCTION OF ANÆSTHETICS INTO AUSTRALIA.

SIR: I have to thank Dr. Gilbert Brown for his kind remarks about my article on the introduction of anæsthetics to Australia and Tasmania. The biographical data concerning David Waldie were obtained from an article that appeared in *The Sydney Morning Herald* for October 27, 1923. This article, a column in length and containing a portrait of Waldie, is from the pen of Mr. Alexander Spence, who throughout the essay refers to Waldie as Doctor Waldie or Doctor David Waldie. The wording on the memorial tablet affixed to Waldie's old house in 67, High Street, Linlithgow, also tells us that he was a Licentiate of the Royal College of Surgeons of Edinburgh. I feel satisfied that David Waldie was a member of the medical profession; but it was as a chemist and not as a surgeon that he achieved fame. It is quite possible that those who write on the genesis of chloroform anæsthesia, are either ignorant of or overlook the fact that Waldie was trained as a surgeon. His career as a surgeon was brief and obscure.

Yours, etc.

NORMAN J. DUNLOP.

Sydney, February 26, 1927.

#### Obituary.

ARTHUR CHARLES ROBERT TODD.

WE regret to announce the death of Dr. Arthur Charles Robert Todd which occurred at Morgan, South Australia, on March 11, 1927.



## Proceedings of the Australian Medical Boards.

### QUEENSLAND.

THE undermentioned have been registered, under the provisions of *The Medical Act* of 1925, as duly qualified medical practitioners:

Spence, Kenneth Kinross, M.B., Ch.M., 1920 (Univ. Sydney), Clermont.  
Williams, Margaret Aileen, M.R.C.S. (England), L.R.C.P. (London), 1919, Brisbane.

#### Restorations to Register:

Smith-Guthridge, John, L.R.C.P. & S. (Edinburgh), L.F.P.S. (Glasgow), 1899, Baralaba.  
Burke-Gaffney, Aylmer Edward, M.B., 1911 (Univ. Sydney), Innisfail.

### NEW SOUTH WALES.

THE undermentioned have been registered, under the provisions of *The Medical Act*, 1912 and 1915, as duly qualified medical practitioners:

Collins, Reuben, M.B., B.S., 1926 (Univ. Melbourne), Barellan.  
Graham, William Arnold, M.B., B.S., 1917 (Univ. Melbourne), Echuca.  
Grant, Jean Elma Doris Margaret, M.B., B.S., 1925 (Univ. Melbourne), Walwa, Upper Murray.

#### For additional registration:

Grogan, Gertrude Urquhart, Ch.M., 1927 (Univ. Sydney).  
Harrison, Charles William, F.R.C.S. (Edinburgh), 1926.  
O'Brien, Clifford Raymond, Ch.M., 1927 (Univ. Sydney).

## Books Received.

THE ARTIFICIAL LIGHT TREATMENT OF CHILDREN IN RICKETS, ANÆMIA AND MALNUTRITION, by Katherine M. L. Gamgee, M.R.C.S. (England), L.R.C.P. (London), D.P.H. (R.C.P.S.), with an Introduction by Professor Leonard Hill, M.B., F.R.S.; 1927. London: H. K. Lewis and Company, Limited. Demy 8vo., pp. 192, with illustrations. Price: 10s. 6d. net.

## Medical Appointments.

Dr. Thomas Longton Tyrer (B.M.A.) has been appointed Government Medical Officer under the provisions of *The Miners' Phthisis Act*, Western Australia.

Dr. Hildred Irving Carlisle (B.M.A.) has been appointed a Medical Officer of Health, Western Australia.

Dr. Francis Bede McCann has been appointed Government Medical Officer at Cargellico, New South Wales.

## Medical Appointments Vacant, etc.

For announcements of medical appointments vacant, assistants, locum tenentes sought, etc., see "Advertiser," page xx.

ADELAIDE CHILDREN'S HOSPITAL: Honorary Physician to Out-Patients.

AUSTIN HOSPITAL FOR INCURABLE AND CHRONIC DISEASES, HEIDELBERG, VICTORIA: Honorary Physician.

MELBOURNE HOSPITAL: Vacancies in the Medical Staff.

RENWICK HOSPITAL FOR INFANTS, SUMMER HILL, SYDNEY:

(1) Honorary Ophthalmic Surgeon, (2) Honorary Ear, Nose and Throat Surgeon.

## Medical Appointments: Important Notice.

MEDICAL practitioners are requested not to apply for any appointment referred to in the following table, without having first communicated with the Honorary Secretary of the Branch named in the first column, or with the Medical Secretary of the British Medical Association, Tavistock Square, London, W.C.1.

BRANCH.	APPOINTMENTS.
NEW SOUTH WALES: Honorary Secretary, 30 - 34, Elizabeth Street, Sydney.	Australian Natives' Association. Ashfield and District Friendly Societies' Dispensary. Balmain United Friendly Societies' Dispensary. Friendly Society Lodges at Casino. Leichhardt and Petersham Dispensary. Manchester United Oddfellows' Medical Institute, Elizabeth Street, Sydney. Marrickville United Friendly Societies' Dispensary. North Sydney United Friendly Societies. People's Prudential Benefit Society. Phoenix Mutual Provident Society.
VICTORIAN: Honorary Secretary, Medical Society Hall, East Melbourne.	All Institutes or Medical Dispensaries. Australian Prudential Association Proprietary, Limited. Mutual National Provident Club. National Provident Association. Hospital or other appointments outside Victoria.
QUEENSLAND: Hon- orary Secretary, B.M.A. Building, Adelaide Street, Brisbane.	Members accepting appointments as medical officers of country hospitals in Queensland are advised to submit a copy of their agreement to the Council before signing. Brisbane United Friendly Society Institute. Stannary Hills Hospital.
SOUTH AUSTRALIAN: Secretary, 207, North Terrace, Adelaide.	All Contract Practice Appointments in South Australia.
WESTERN AUS- TRALIAN: Honorary Secretary, 65, Saint George's Terrace, Perth.	All Contract Practice Appointments in Western Australia. Yarloop Hospital Fund.
NEW ZEALAND (WELLINGTON DIVI- SION): Honorary Secretary, Wellin- gton.	Friendly Society Lodges, Wellington, New Zealand.

## Diary for the Month.

- APRIL 5.—New South Wales Branch, B.M.A.: Council (Election of Officers and Standing Committees).  
APRIL 5.—Tasmanian Branch, B.M.A.: Council.  
APRIL 6.—Victorian Branch, B.M.A.: Branch.  
APRIL 6.—Western Australian Branch, B.M.A.: Council.  
APRIL 7.—South Australian Branch, B.M.A.: Council.  
APRIL 8.—Queensland Branch, B.M.A.: Council.  
APRIL 11.—New South Wales Branch, B.M.A.: Organization and Science Committee.  
APRIL 12.—Tasmanian Branch, B.M.A.: Branch.  
APRIL 12.—New South Wales Branch, B.M.A.: Ethics Committee.  
APRIL 14.—Victorian Branch, B.M.A.: Council.  
APRIL 14.—New South Wales Branch, B.M.A.: Clinical Meeting.  
APRIL 19.—Tasmanian Branch, B.M.A.: Council.

## Editorial Notices.

MANUSCRIPTS forwarded to the office of this journal cannot under any circumstances be returned. Original articles forwarded for publication are understood to be offered to THE MEDICAL JOURNAL OF AUSTRALIA alone, unless the contrary be stated.

All communications should be addressed to "The Editor," THE MEDICAL JOURNAL OF AUSTRALIA, The Printing House, Seamer Street, Glebe, Sydney. (Telephones: MW 2651-2.)

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